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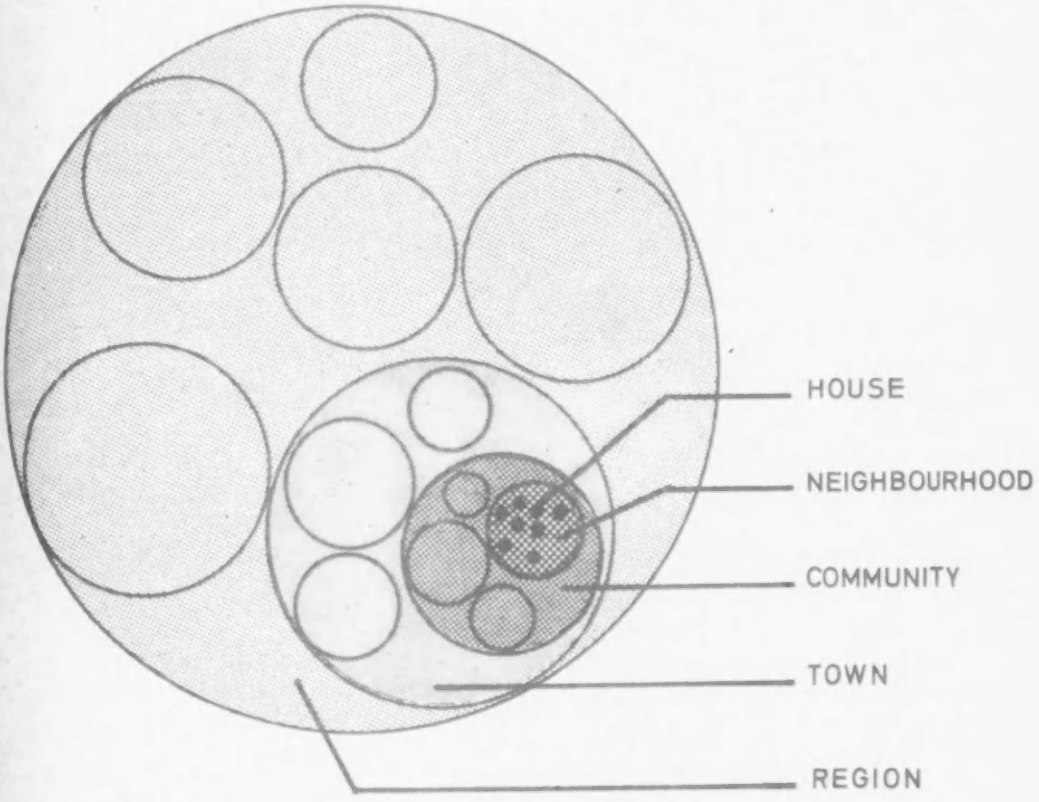
EKISTICS

ABSTRACTS ON THE PROBLEMS AND SCIENCE OF HUMAN SETTLEMENTS

ΟΙΚΙΣΤΙΚΗ

MARCH · 1960



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E K I S T I C S

ABSTRACTS

of

THE PROBLEMS AND SCIENCE OF HUMAN SETTLEMENTS

Published By

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Consulting Engineers
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TABLE OF CONTENTS

EDITORIAL 165

ABSTRACTS ON HOUSING PLANNING AND CONSTRUCTION

Popular Housing in Pre-Columbian Mexico	Carlos R. Margain	167
Construction Methods for Popular Housing in Mexico (with illustrations pp. 170, 171, 172)	Jaime Ros y Poch	169
Housing Layout: 'Unit Square' Diagrams (with illustrations pp. 175, 177)	I. C. Macpherson and C. P. Woodford	174
Construction of Experimental 'F' Type Quarters at New Delhi (with illustrations pp. 181, 182, 183)	Journal of the National Buildings Organisation, India	180
Prefab Apartments: Produced in Copenhagen, Erected in Germany (with illustrations p. 185)	Engineering News-Record	184
Shrinking Aggregates in the Construction Industry in South Africa (with illustrations pp. 189, 191, 193)	T. L. Webb	187
Handicrafts in Turkey	Cahit Talas	195
Farm Plot Consolidation in Spain (with illustrations pp. 201, 203)	Javier de Salas and Roy J. Smith	199
Philosophy and Objectives of Watershed Development	S. V. Ciriacy-Wantrup	205
Approaches to Community Development in Urban Areas in Asia and Africa	United Nations	209
Hollow Cities (with illustrations pp. 217, 219)	Peter Lyon	215

CURRENT WORK OF DOXIADIS ASSOCIATES

House Types for the Korangi Area (with illustrations pp. 223, 229, 231, 233, 235) — Doxiadis Associates — 221

APPENDIX

Recent Publications — 236

EKISTICS is compiled by Mrs. Gwen Bell under the direction of Professor J. Tyrwhitt.

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EDITORIAL

HOUSING AND CONSTRUCTION: TRANSITION FROM THE TRADITIONAL

Several articles on traditional house types have been abstracted in EKISTICS. This month a Mexican anthropologist claims that the present rural housing of Mexico can be assumed to be very similar to its Pre-Columbian housing. The practical point of view of an experienced housebuilder upon discussional coordination is excellently illustrated in another paper abstracted from a Civil Engineer's Congress in Mexico. While this article mainly discusses house construction from an economic point of view, the problem is also raised of the relation of standardization to monotony: a question which will come up again in many articles this month.

The row or terrace house has been a traditional workable form for low cost housing developments in all climatic conditions and all parts of the world. I. C. Macpherson and G. P. Woodford analyse possible different ways of organizing them, rather than the traditional parallel arrangement. This shows some interesting forms, which are just as practical, and yet create some diversity and a more amenable environment for the individual house. In India, a detailed study has been carried out to make this traditional type of dwelling for governmental workers more economical by changes in construction, while not lowering the basic amenities for living.

While these studies have an effect in furthering the possibility of low cost housing, a more dramatic effort was put forth in Hamburg where great blocks of apartments were entirely prefabricated. Such prefabrication and mass building holds great potential for cutting housing costs in the future, though within this saving is the problem of the monotony of industrialized housing, which was discussed earlier in relation to Mexico and is discussed later in the Doxiadis Associates article on standardized housing for Pakistan.

In the industrialization of housing, it is often necessary to depend on new materials and techniques, rather than the traditional ones. In the case of Hamburg this was pre-stressed concrete, a material which lends itself very much to such construction. In the awareness of this, T. L. Webb has analyzed the effects of the use of shrinking aggregates in the construction industry in South Africa. He points out the shortcomings and care which must be taken in the use of such modern materials, and as such has made a contribution to the possibility of more industrialized construction methods in South Africa.

The article on the work of Doxiadis Associates illustrates several of the points raised in the articles just described. Its subject is the standardized house types designed for the Korangi area of Pakistan and its problem has been to use contemporary techniques of mass production to create liveable and pleasant dwelling units within the means of the three lowest income groups of the population.

REGIONAL DEVELOPMENT: TRANSITION FROM THE TRADITIONAL

The industrial base of countries throughout the world is rapidly changing in some cases from handicraft to manufacturing, in others from manufacturing to automation. Cahit Talas describes the particular problems in Turkey in the transition from the handicraft stage and points to the contribution that both handicrafts and small-scale industries still have.

Many changes are taking place in agricultural patterns and rural development throughout the world. Two of the most talked of changes are those of the redistribution of agricultural land to form holdings of a scale in keeping with modern techniques and the large scale planning of watershed regions. Javier de Salas and Roy J. Smith outline some of the changes which are now taking place in Spain. These changes include both the breaking up of large estates and the forming of larger scale units from fragmentary farm plots. S. V. Ciriacy-Wantrup approaches planning of watershed areas from the point of view of its validity for policy making. He traces both when the watershed can be useful as a unit for large scale planning and when it is meaningless.

CITY AND COMMUNITY LIFE: TRANSITION FROM THE TRADITIONAL

In the transition from traditional forms of life built on primary associations to that of industrialized societies, it becomes necessary for the individual to adapt himself to a larger number of levels of social contacts. This change and the problems which it brings to the individual has been the subject of much work done on community development in urban areas. EKISTICS has abstracted the report on this development in Asia and Africa from the United Nations Series on Community Development. It shows how many of the problems of transition to urban life have been solved informally through the development of new relationships in urban communities.

Peter Lyon traces the industrialization of the cities and carries it to its logical extreme--to the point where the city is "hollow"--where industrialization denies the development of the citizen of the city. He then points out that when man is no longer a meaningful part of the city, the city will die. In over-stating his case, Lyon raises points which students of ekistics should heed in their study of human settlements.

Margain, Carlos R.
POPULAR HOUSING IN PRE-COLUMBIAN MEXICO
IVth National Congress of Civil Engineering, Mexico, October 20-25, 1958.
Printed Pamphlet. Spanish. 16 pages. Illustrations.
728.031 (72)

1. The IVth National Congress of Civil Engineering in Mexico in 1958 has just recently come to the attention of EKISTICS. Two papers from this conference are therefore featured this month. The first, by Carlos R. Margain, an anthropologist, discusses some aspects of the traditional housing types in Mexico. The second, in contrast, deals with construction methods for modern housing.

2. The archeological wealth of Mexico is proverbial. From the time of the Spanish conquest to the present many scholars and travelers have studied the pre-Columbian and pre-Cortesian civilizations. Yet there are still many aspects of the pre-Columbian past that have been barely outlined. One of these is housing. Despite the lack of archeological research in this subject, it is possible to speak about housing in pre-Columbian Mexico because the ethnic roots of the population are still clearly recognizable today.

3. The descriptions of the city of Teotihuacan in the valley of Mexico by Bishop Lands are so clear that there should be little doubt that these concentrations of public buildings, shrines, pyramids, observatories, etc., actually deserve the name of a city, although it must have had the low densities of present day suburbs.

4. In the city of Teotihuacan three major districts may be recognized:

a. the great monumental zone,
b. residences of priests and officials,
c. the area inhabited by common people (houses surrounded by cultivated land).

In order to operate this center a large number of individuals of various categories must have been required. Some of these people (high priests and officials) must have resided permanently in the monumental zone. However, the place of permanent residence of lesser officials was in the second zone. The rest of the population occupied the outlying areas where the soil was rich and water available. Even today the population is concentrated in similar areas. This seems to be one of the reasons that renders it particularly difficult to locate remnants of pre-Columbian dwellings. Not only the materials used in the construction of these dwellings must have been of little durability (timber, straw, mud) but the very localities where they were erected seem to have been used for residential purposes generation after generation up to the present time.

5. The Carnegie Institute has carried out studies of the Mayan city of Uaxactun in the region of El Peten, Guatemala. This work was intended to determine the population density in the area around one of the religious centers. According to a conservative estimate, the population density around Uaxactun was 271 persons per square mile which indicates the town could have had some 50,000 inhabitants. For the more important cities of Palenque, Tikal, and Copan higher densities would be assumed resulting in populations of about 200,000 each.

6. Some indication is thus given as to the size and pattern of some pre-Hispanic cities. Corn was the basic crop of all cities and villages. This has carried over to the present day, and the pattern and methods of production and consumption have not been substantially modified over the last 3,000 years. Thus, it could be reasoned that the patterns of the present housing must have also kept many of its pre-Columbian features.

7. It has been found that the corn farmer works about 190 days of the year for the production of twice as much corn as his family will consume in a year. The farmer then has 175 days left for other activities. The consensus of studies is that poor materials were used in the construction of his house, on which little time was spent, due to the building of the hundreds of large elaborate sculptures and structures in the pre-Columbian cities.

Poch, Jaime Ros y
CONSTRUCTION METHODS FOR POPULAR HOUSING IN MEXICO
IVth National Congress of Civil Engineering, Theme 2, Construction and Conservation. Mexico, October 20-25, 1958. Mimeographed Paper. 10 pages. Illustrations.
69.002 (72)

1. Mr. Jaime Ros y Poch, supervisor of the National Institute of Housing, presented both a paper stating his philosophy on the goals for national housing and more specific graphic illustrations on construction techniques. EKISTICS has abstracted his paper and presents three of the series of excellent illustrations.

2. The general approach for the solution of the housing problem will consist of taking advantage of the studies which have been conducted for the past several years on the science of housing, as suggested by the Interamerican housing center at Bogotá, Colombia: "To build houses is one of the oldest activities of mankind. Economically housing represents one of the largest fields of investment in the world, and it is almost incredible that not until 1952, in Bogotá, the first effort to create a science of housing should have been started. In the past, housing was left to improvisation, to intuition, to the often mistaken traditional methods, and to inefficiency. Today CINVA has promoted the improvement of building techniques, and house design and administration, as well as educational and social efforts toward the improvement of the physical environment and the goal of a family life integrated with the community as part of the natural destiny of man. In this way CINVA fulfills an important function in the development of the American Nations."

3. The establishment of the foundations of this new science depend on the transformation of building methods and of financing. Our confidence in this approach finds powerful support in the fact that technical resources and sociological research in this field grow more effective every day. Some of the more experienced persons insist that the housing problem is exclusively of a financial nature, and they will even say that no other factor of a technical or urbanistic nature has any significance in the solution of the problem. Through our long experience as builders, however, we know of the great loss of energies and resources caused by the lack of planning in projects of this nature.

4. In order to initiate the findings of promising results under the basic objective of providing housing for the majority of our fellow men, coordination among specialists in this field is indispensable. It is necessary to provide foundations for this new science with the contribution of sociologists, economists, city planners, architects, engineers, builders, etc. There is an urgent need for the creation of new centers of investigations, and for the assurance of continuity for all projects and studies.

Illustration 1. The need to PLAN housing projects and to foster the construction of homes, requires the perfecting of METHODS OF CONSTRUCTION already known and the study of new ones. If we study with a sense of ORGANIZATION the use of materials in the erection of walls we find the need for manufacturing these materials with a clear sense of MODULATION. It has been left to the improvisation of the bricklayer to secure the pieces and to design the wall intersections without taking into account the mortar resulting from knocking off with the trowel the sizes required in the construction of the wall. The evidence of the WASTE caused by use of routine methods is shown in the photograph at the bottom of the page. This material could have been used to build 20-30 percent more units.

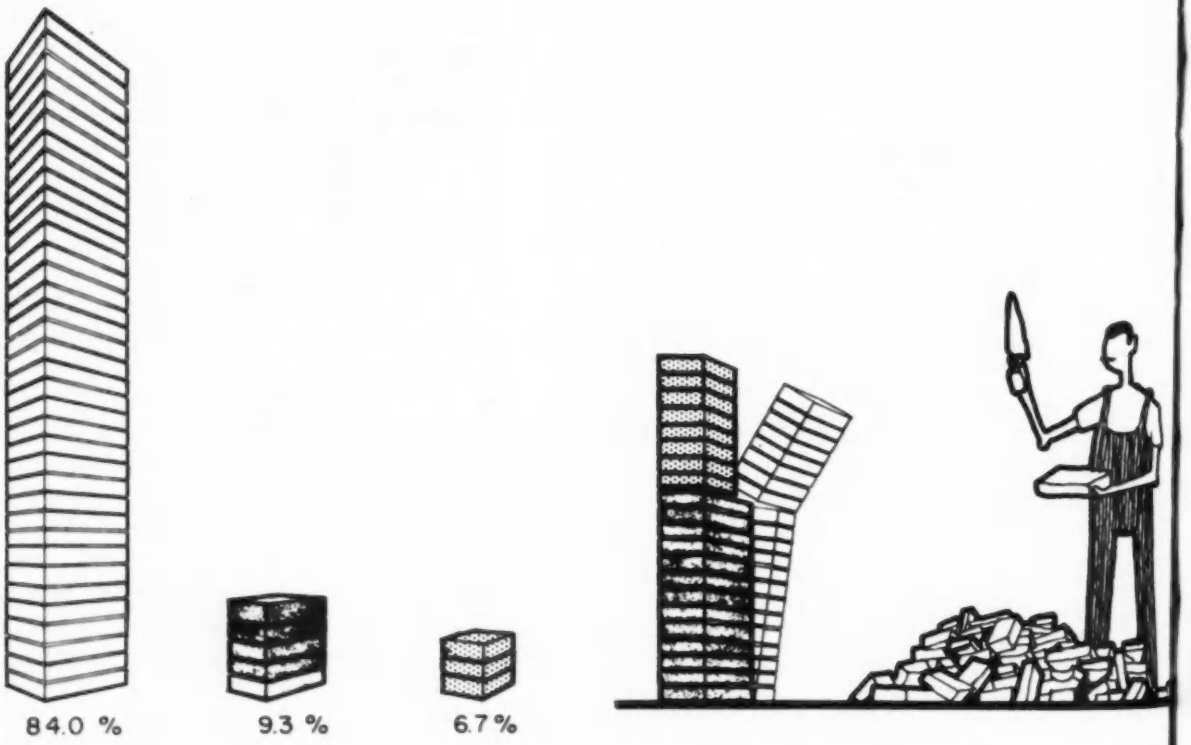


Illustration 2. In order to apportion the right dimensions in the manufacture of brick (for walls and partitions) we must consider the thickness of the mortar joints. The sum of that dimension plus the width of the brick produces the MODULE for the proportioning of other brick dimensions. In order to prevent waste and to produce sound and neat wall intersections, it will be necessary to manufacture pieces of 3/4 and 1/2 sizes.

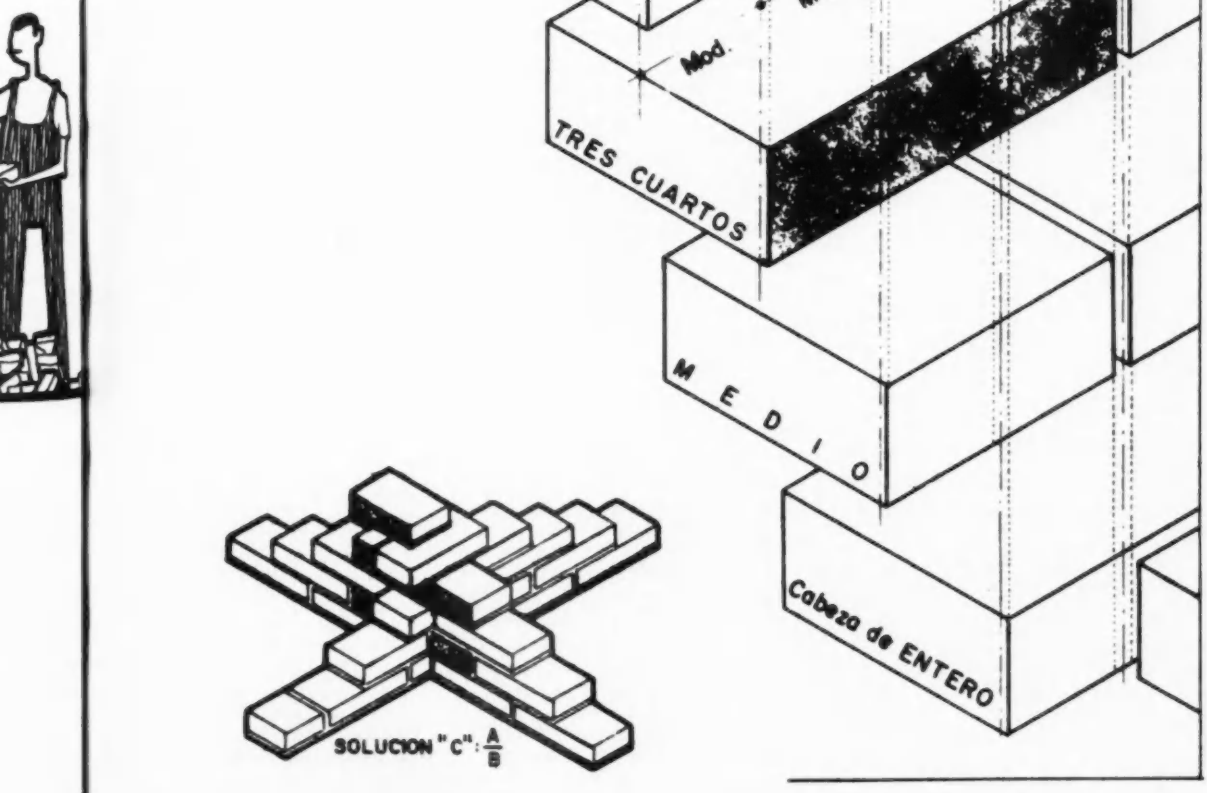
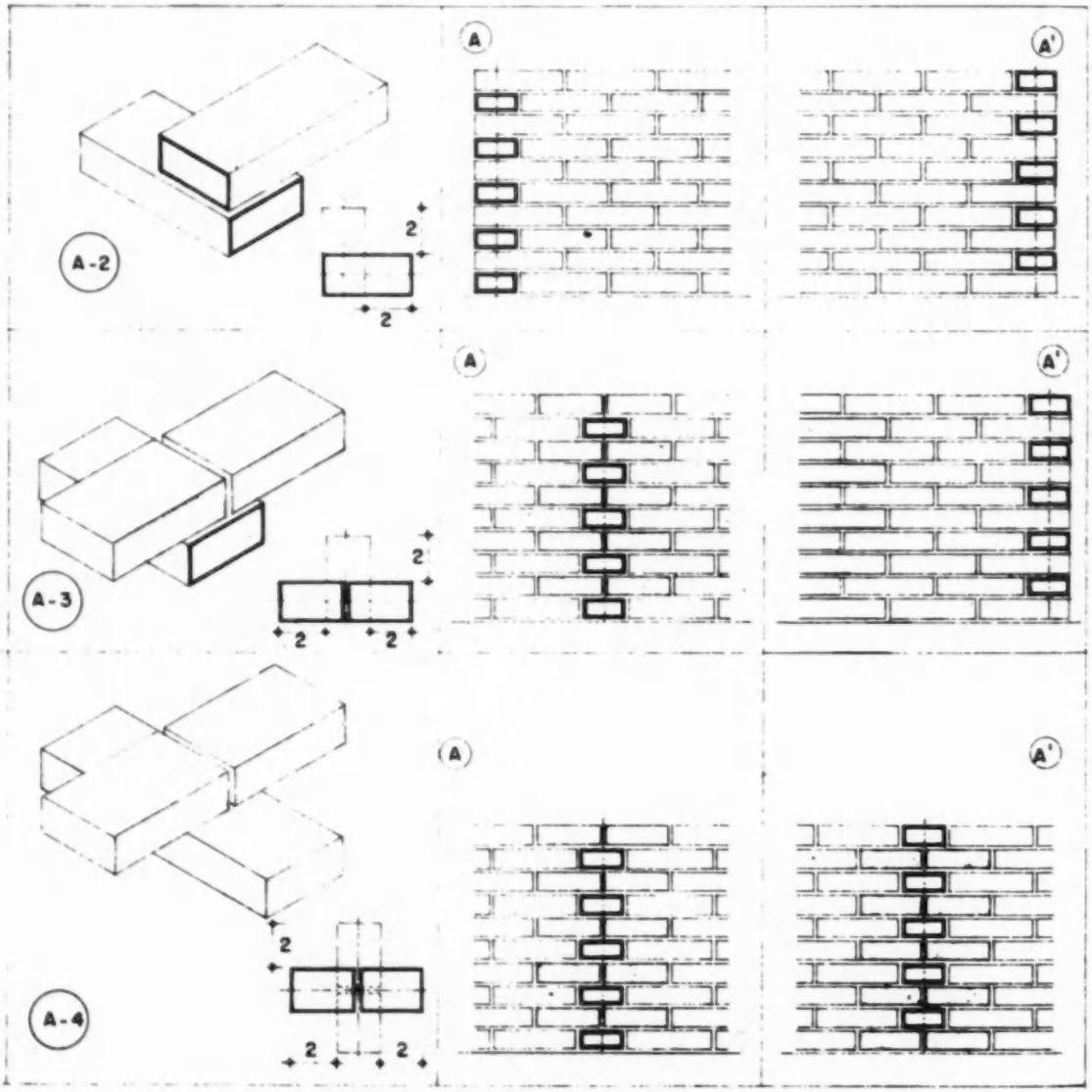


Illustration 3. EKISTICS presents the first solution of many outlined. We call Solution A that of wall intersections (corner, T, or cross) that produce a bond that grows by repeating 2 modules in every pair of layers (joints alternating at the center of the bricks). At the same time, the distance from the axis of the intersection is incremented by an even or odd number of modules, alternately. In a given wall we can modulate and standardize its center-to-center dimension by taking into account the solutions used at the end intersections.



5. The task is one of great magnitude and the construction industry must be fitted more like a true modern industry. If it is to measure up to the demand for housing that will come about in the near future. The construction industry has, in some of its branches, followed the advances of world industrialization, but in others it has remained tied to methods and materials which are centuries old and have not been subjected to an exhaustive analysis by means of which modern technicians might find more efficient processes. The limited skills of many workers can only produce, under present circumstances, great wastes of materials and time.

6. The construction industry will have to review carefully the methods and systems of work that it is using in the field of housing in order to assure the following:

a. Improvement of methods of construction that have been used routinely for centuries;

b. Promotion of the specialization of labor in order to produce advances in productivity, improved economic and moral conditions for the workers, and a better allocation of time and capital in each case;

c. Standardization of work and modulation which will be the elements (or tools) which will enable us to catch up with the housing needs of the population.

7. True industrialization and complete mechanization in all tasks that make up the construction of housing has to go through processes of perfecting each one in turn in view of the backwardness which affects many of them. This perfecting could be achieved if current methods are studied and an elementary type of mechanization is then applied to them as a first stage toward future improvement. This first step can be analyzed in the light of the industry's own trends:

a. Modulation,

b. Standardization,

c. Mass production.

In order to provide sound foundations for future fabrication of those new materials that ought to measure up to the demands of industrialized construction, we consider a systematic study should first be made of all of those materials which have been used for many years in a routine manner.

Macpherson, I. C., and Woodford, G. P.
HOUSING LAYOUT: 'UNIT SQUARE' DIAGRAMS
Journal of the Town Planning Institute, Vol. xiv No. 1, December 1959,
Pages 13-15. Illustrations.
711.62 (100)

1. I. C. Macpherson and G. P. Woodford present what they call a "five-finger exercise" in site design of row housing. This exercise provides some useful and practical examples for breaking away from the too usual monotonous row housing which occurs throughout the world. They have chosen a very neutral unit form, that of some six houses with a reasonable minimum of space in front and behind shown in Figure 1. From this unit square of about 120 feet per side, they then show various different combination arrangements.

2. Two units can be put side to side in seven distinct ways. Of these Figure 2 is still the basis of most layouts. The little used Figure 8 is, however, the most intrinsically promising juxtaposition of the seven. Compared with Figure 2 the views from windows are opened up; privacy and daylighting are both better. The end of one row partially blocks the direct views from the windows of one or two houses in the other, but it would be possible to see obliquely past and over the terraces ahead at an angle of 30' or less. Where a road runs perpendicularly past the end of a terrace the furthest front door will be within 110 feet or so of it.

3. A single 'broken cross' layout, Figure 4, is produced by two pairs of units disposed like those of Figure 3. The density is the same as that of parallel terraces. Although it has the advantages mentioned, the problem is that of getting roads through conveniently. A road cannot be taken through from A to B in Figure 5 without cutting through the back gardens. This suggests that one row of crosses might be shifted slightly over the adjacent row. This produces the layout of Figure 6.

4. Another way of fitting crosses together is to use alternatively crosses like those of Figure 4 and their mirror image (Figure 7). This produces the layout of Figure 8 in which the length of the terraces is doubled and the backs are parallel while the fronts are perpendicular. Both layouts in Figures 6 and 8 have some good points. In neither of them is there any loss of density; both provide room for reasonably direct roads and pedestrian ways perpendicular to the roads. Figure 6 suggests the possibility of visually interesting layouts.

5. To take now the garage problem: garages can be fitted into layouts by shortening terraces or sacrificing back gardens, but it is better to have spaces out of sight of front windows. The simplest solution is to allot one square for garages and service access to four residential squares, arranging the terraces so that they present their gable ends to the garage square (Figure 9). To provide a garage for every house is easy, but residential density falls by a fifth and garage squares tend to become the focal point of the community (Figure 11).

Fig. 1.

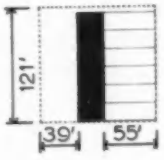


Fig. 2.

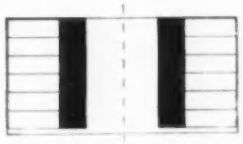
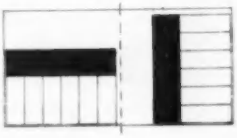


Fig. 3.



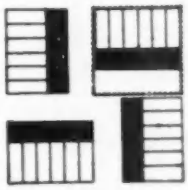


Fig. 4

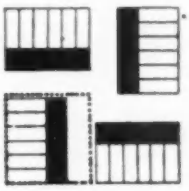


Fig. 7

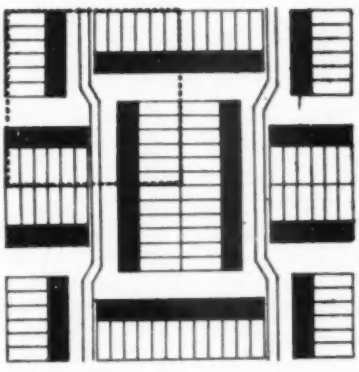


Fig. 8

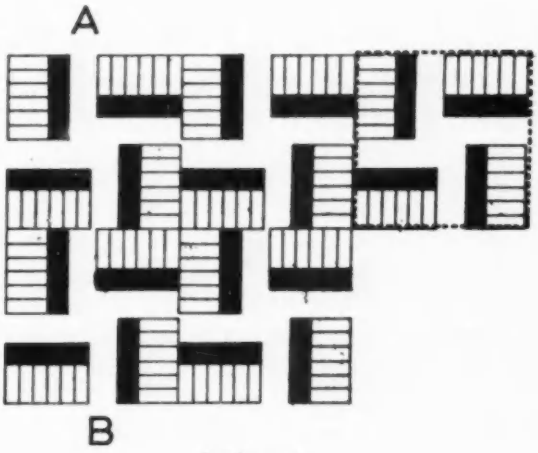


Fig. 5

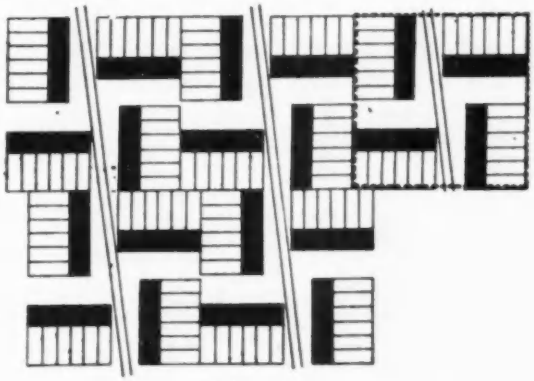


Fig. 6

6. Alternatively eight residential squares can be linked with one garage square, providing garages for about two-thirds of the households (Figures 10 and 12). The garage square would in this case provide the back way in; front doors are oriented to linked open spaces through which footpaths can form a traffic-free system (Figure 13). There is no front window vis-á-vis. Other arrangements of these five and nine square systems are possible, but to achieve a sense of unity in any layout on these lines would be difficult.

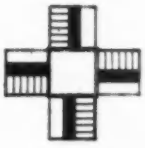
7. A more promising method is to allot a smaller garage-service unit to four residential units. One may take a rectangular space of any dimensions found suitable and dispose the residential squares round it as in Figure 14. The resulting vaguely cruciform shapes will fit exactly together without leaving any spaces over. Thus by taking a square of about half the area of the residential square for garages one arrives at Figure 15. This gives a 10% reduction of density below that of the more common parallel terraces and provides open views from most windows, garages grouped out of sight in small courts and a precinctual arrangement of houses. It does not, however, provide adequate garaging, and its open spaces are restricted and cut up by roads.

8. Modifications are illustrated in Figures 16 and 17, in which the garage unit is slightly larger and gaps are left between each set of squares so as to increase the precinctual space. In Figure 17 half the terraces are reduced in length and the road goes through in the other direction; garage-service squares have become cul-de-sacs leaving wide pedestrian ways parallel to the road. Half the precincts are free of vehicle traffic.

9. A more usual way of inserting garages into the layout can be applied successfully to Figure 8, the long terraces parallel to the road being split and a garage street being run between them. This has the compensatory effect of increasing the size of the broken cross squares, and giving them a more precinctual character (Figure 18).

10. Ed.: This interesting article assumes that orientation of row houses presents no problem. This is true in the very temperate climate of England where the east-west sun is as welcome as the southern sun and the same house plan can be employed. In other countries it would be necessary to have alternative ground plans for the different orientations.

Fig. 9



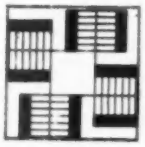


Fig. 10

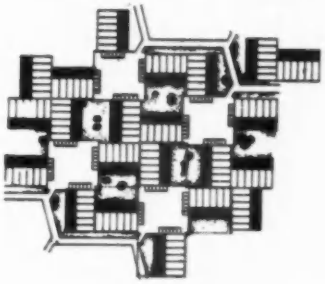


Fig. 11

Fig. 12

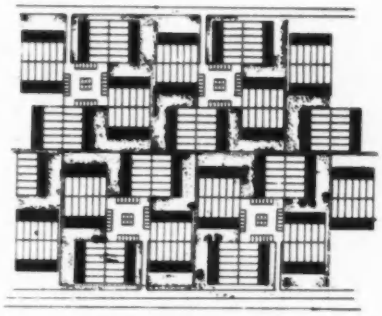


Fig. 13

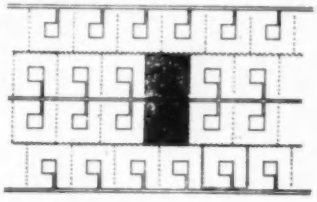


Fig. 14

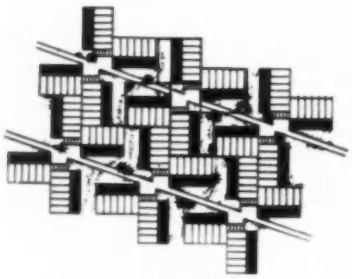


Fig. 15

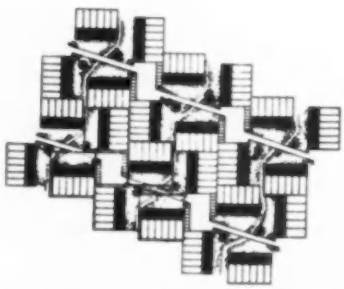


Fig. 16

Fig. 17

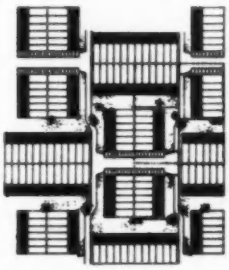


Fig. 18

Journal of the National Buildings Organisation, India

CONSTRUCTION OF EXPERIMENTAL 'F' TYPE QUARTERS AT NEW DELHI

Journal of the National Buildings Organisation, Vol. 4, No. 1, January, 1959, Pages 25-28. Illustrations.

728.31 (540)

1. Cost is a highly important consideration in the building of housing, especially in developing countries. Too often the basic needs of the people are reduced in the cutting of the cost. The Experimental Housing Division of the National Buildings Organisation, proposed that an experimental block of eight F-type flats be constructed, using traditional materials and methods, without alterning the basic plan, and without introducing drastic changes in the design and specifications; at the same time cutting down the cost to the maximum possible extent.

2. The F-type quarters are meant for Government servants drawing a salary of Rs. 150 to Rs. 249 per month ($30 to $50). The existing F-type quarters constructed by the Government in Delhi, consists of one sitting-room, 14' 6" x 10', one bedroom 12' x 10', one kitchen 8' x 7', one bath, one W.C., two storage cupboards and a rear verandah 14' 6" x 8'.

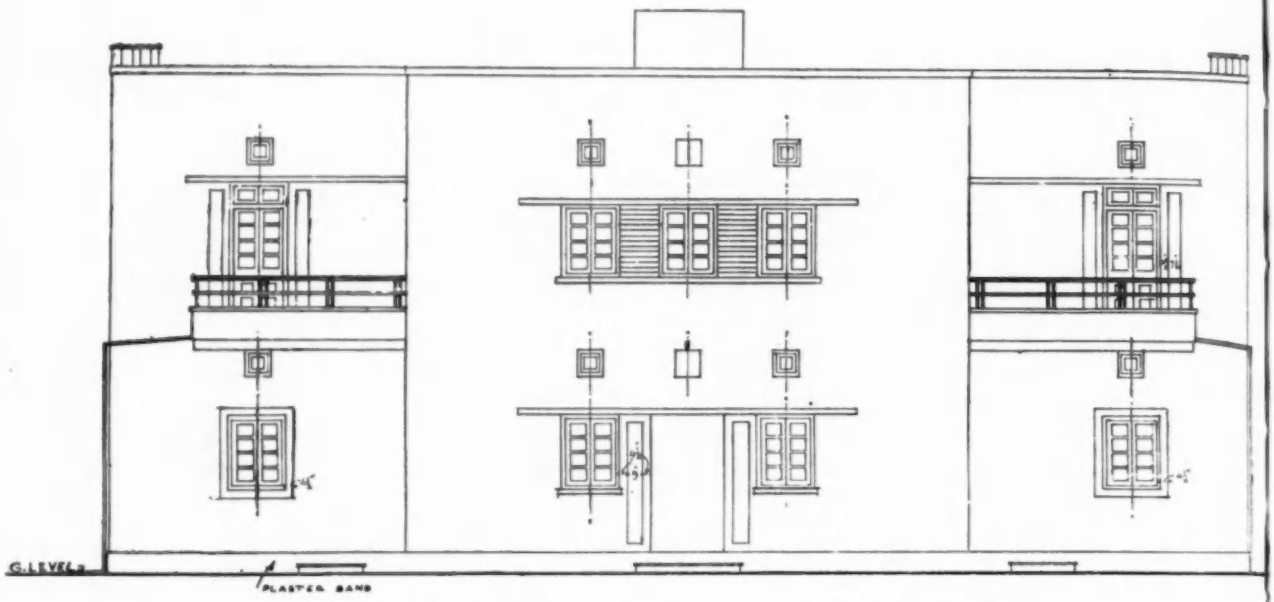
3. The cost for a block of eight such quarters (four on the ground floor and four on the first floor with two staircases) is approximately Rs. 44,000/- ($9,000) for the structural building and Rs. 5,600/- ($1,100) for internal water-supply and sanitary installations. The cost of this one experimental block is approximately Rs. 37,000/-($7,400) for the structure and approximately Rs. 5,000/- ($1,000) for water supply and sanitary installations. Thus a saving of approximately 16% was effected in the cost of the structure and a saving of approximately 11% was effected in the cost of internal water-supply and sanitary installations.

4. The abstract of comparative costs are included on Page 181.

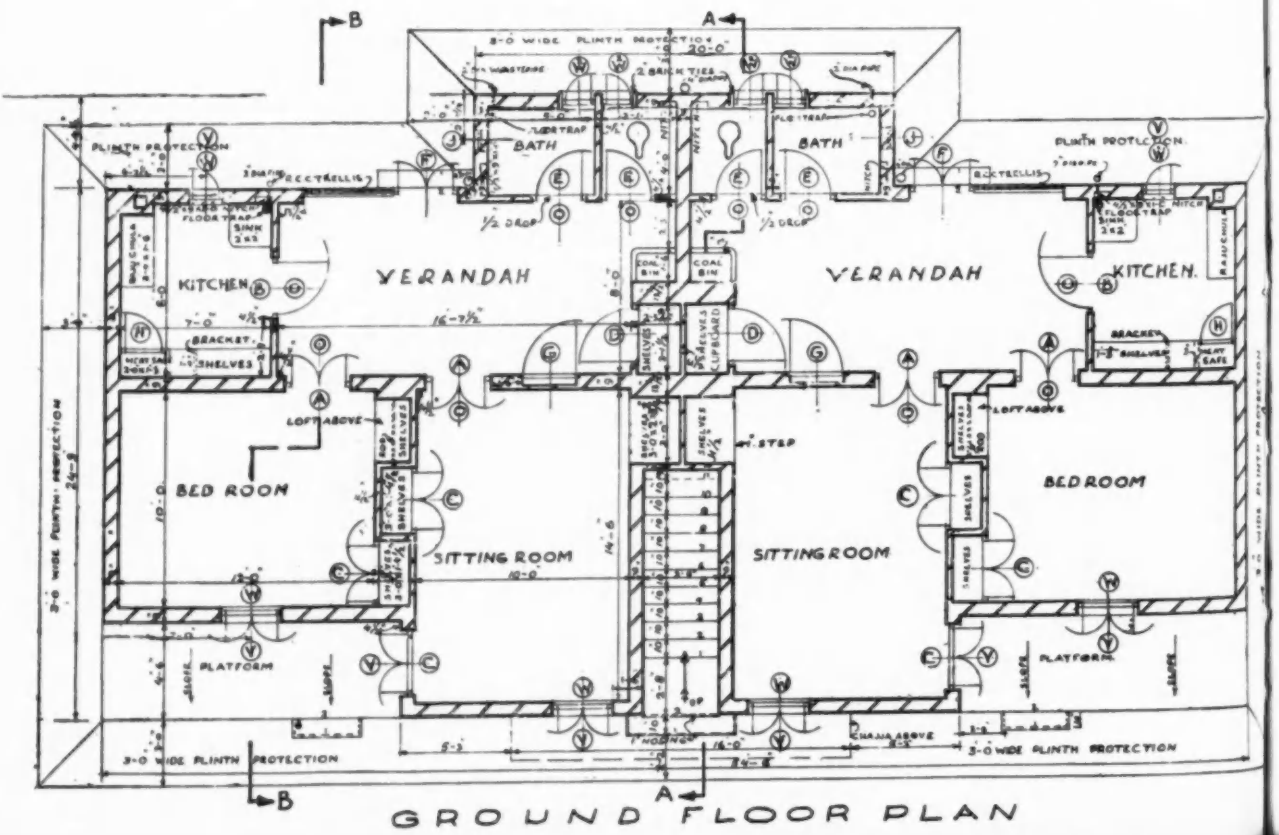
Comparative Abstract of Costs :—(i) A block of 8 Govt. 'F' Type Flats (ii) A Block of Experimental 'F' Type Flats

A Block of 8 Government 'F' Type Flats.	A Block of 8 Experimental 'F' Type Flats.	Saving Rs.	% of total Cost.	Remarks	A block of 8 experimental 'F' type flats based on recommendations generally acceptable to the senior officers of C.P.W.D., M.E.S., & N.B.O.	Saving Rs.	% of total cost	Remarks
2	3	4	5	6	7	8	9	10
'A'	'B'				'C'			
Cost of Building portion = Rs. 44000/- approximately	Cost of Building portion (with the basic alteration in plan) = Rs. 37,000/- approximately.	7000/-	16	Cost of Govt. flats is on the of mass construction. Whereas the cost of experimental flats is on the basis of only one block of flats actually built. Mass construction is likely to bring down the cost further by 2 to 3%.	Cost of building portion = Rs. 38,700/-	5,300/-	12	
Details of Design and Specifications.	*Details of Design and Specifications.*	*Details of Saving.*	*Details of percentage.*		*Details of Design and Specifications*	*Details of Savings*	*Details of percentage.*	
(a) *Wood work* :	(a) *Wood Work* :	2800/-	6½		(a) *Wood work* :	2000/-	4½	
(i) Area of windows and ventilators = 22% of floor area.	(i) Area of windows and ventilators = 10% of floor area				(i) Area of windows and ventilators = 12% of floor area.			
(ii) Size of door and window frames 4'x3"	(ii) Size of window frames 3'x2" and doors frames 3'x3".				(ii) Size of window frames 3½'x2½" and door frames 3½'x3".			
(iii) Teak wood frames for doors & Windows.	(iii) Sal-wood frames for doors and windows.				(iii) Sal-wood frames for doors and windows.			
(iv) 1½" T.W. shutters for doors and windows.	(iv) 1" T.W. shutters for windows and 1½" for doors.				(iv) 1½" T.W. shutters for windows and 1½" for doors.			
(v) Clear height of doors = 6'– 9"	(v) Clear height of doors 6'—3"				(v) Clear height of doors 6'—6"			
(b) *Brick work* :	(b) *Brick Work* :	2900/-	6½		(b) *Brick work* :	2500/-	5½	
(i) Height of each floor including slab = 11'—0"	(i) Height of each floor including slab = 10'—0"				(i) Height of each floor including slab = 10'.			
(ii) 13½" brick wall in mud mortar for ground floor.	(ii) 9" second class brick wall in cement lime mortar 1:1:9.				(ii) 9" second class brick wall in cement lime mortar 1:1:9.			
(iii) 9" Mixed class brick work in cement mortar 1:6 for first floor.	(iii) 9" second class brick wall in cement lime mortar 1:1:9.				(iii) 9" second class brick wall in cement lime mortar 1:1:9.			
(iv) Plinth height 1'—6"	(iv) Plinth height 1'—0".				(iv) Plinth height. 1'—6"			
(v) Plinth masonry 1'—6" wide with plinth offset.	(v) Plinth masonry 9" wide only with no plinth offset.				(v) Plinth masonry 9" wide only with no plinth offset.			
(vi) Shallow foundations for non-load bearing partition walls.	(vi) Non-load bearing partition walls founded on the floor only.				(vi) Terrace parapet 4½" thick with 9"x9" pillars,			
(vii) Terrace parapet 9" thick.	(vii) Terrace parapet 4½" thick with 9"x9" pillars.							
(c) *R.C.C. Work* :	(c) *R.C.C. Work* :	900/-	2		(c) *R.C.C. Work* :	400/-	1	
Conservative design assumption and practice.	As per Indian Standard Code I.S. 456-1953.				Tensile stress in steel reinforcement 16000 lbs per sq. in. Other assumptions as per Indian Standard Code I.S. 456-1953.			
(d) *Miscellaneous*	(d) *Miscellaneous.*	400/-	1		(d) *Miscellaneous*	400/-	1	
Wider foundation etc. due to thicker walling and heavier loading.	Rational design of foundations etc. Total :	7000/-	16		Rational design of foundations etc.	5300/-	12	
Cost of Internal water supply and sanitary installations = Rs. 5600/-	Cost of Internal water supply and sanitary installations = Rs. 5000/-	600/-	%	Saving due to reduction in building height and omission of anti-syphon pipes.	Cost of Internal water supply and sanitary installations = Rs. 5000/-	600/-	11	Saving due to reduction in building height and omission of anti-syphon pipes.

Type Designs of Experimental Two-roomed Flats ('F' Type)

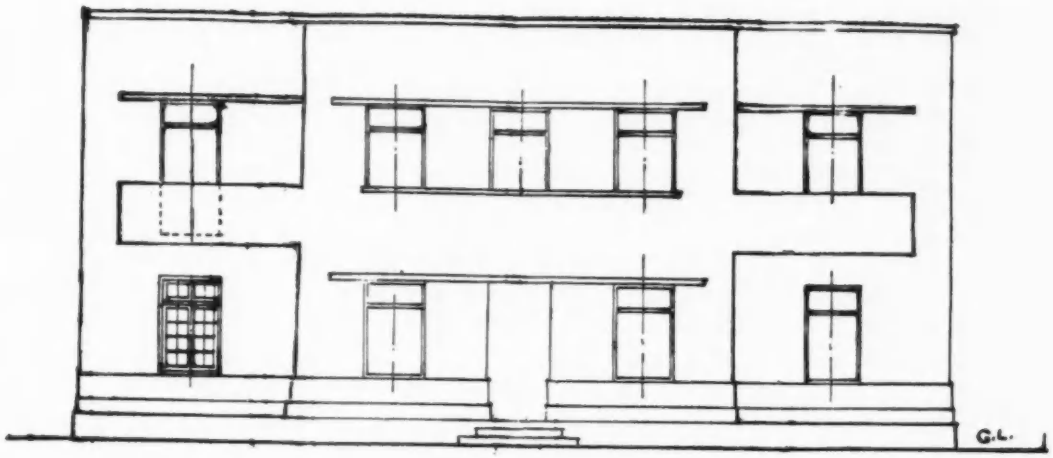


FRONT ELEVATION.

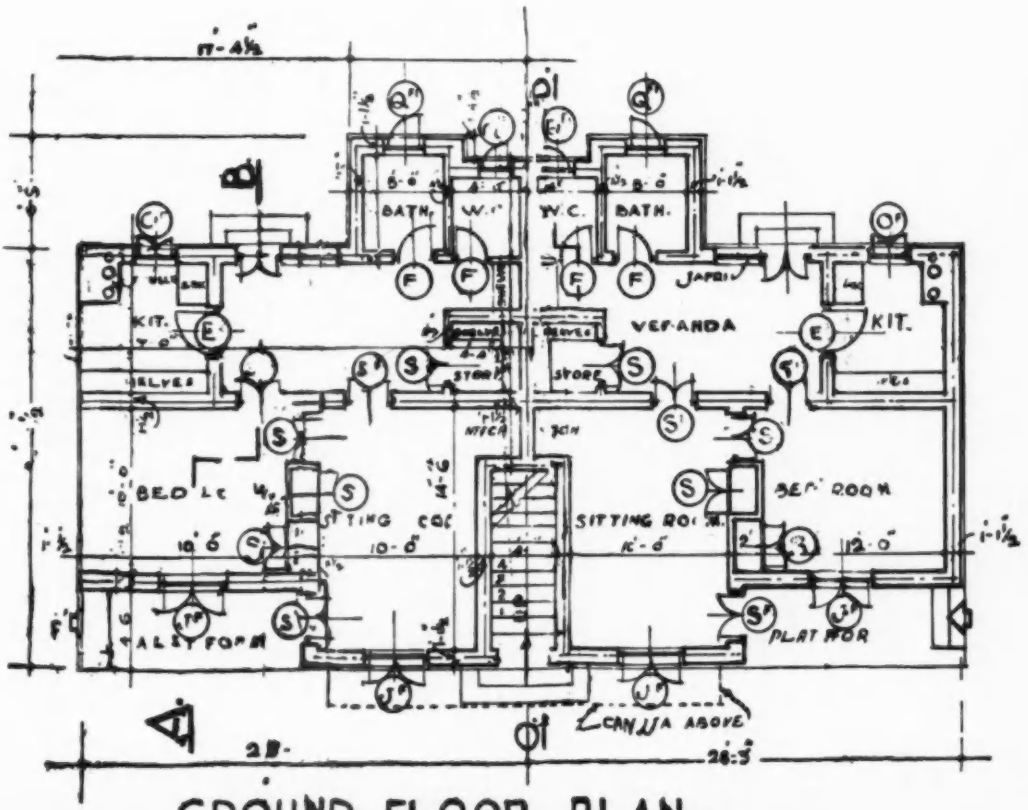


GROUND FLOOR PLAN

Revised Type Design



FRONT ELEVATION.



GROUND FLOOR PLAN ...

Engineering News-Record
PREFAB APARTMENTS: PRODUCED IN COPENHAGEN, ERECTED IN GERMANY
Engineering News-Record, December 3, 1959. Pages 34-36. Illustrations.
69.002.2 (489) (43)

1. Engineering News-Record reports on an extremely large scale prefabrication project which was completed in a very short time. This is a forecast for the future of the possibilities of building and international cooperation.

2. In just 22 weeks, Danish builders have put up 116 preassembled apartment units in Hamburg, Germany. The project is a good demonstration of how far you can stretch the "pre" in precasting and prefabricating.

3. Hamburg was fighting a losing battle against a growing housing shortage. Shortage of skilled construction workers was a major reason. So the city surveyed developments in housing construction throughout Europe. Conclusion: Only a thoroughly "industrialized" system of housing construction could bring housing capacity up to demand.

4. The survey ended at Larson and Neilsen Constructors, Ltd. of Copenhagen. L and N got into the precasting business soon after World War II. The firm began by precasting and prestressing for industrial construction; then it started producing and erecting housing projects, using prefinished components. L and N prefabricated all components for the apartments in its Copenhagen plant, cutting on-site labor to a minimum. Then components were shipped to the site in Hamburg. Here's how it worked:

5. In the plant, floor and ceiling slabs are cast and finished, complete with any necessary horizontal utility lines. Partitions include door frames, doors and all hardware. Exterior wall panels leave the factory ready to use, with glass in the window frames. On some jobs, even venetian blinds go in at the factory. Precast bathroom units include all plumbing fixtures to be hooked up to the plumbing risers in the assembled building.

6. Each day last summer a train left the plant carrying all components for two apartment units. And every day a train pulled onto the Hamburg site 600 miles away. Temporary rail sidings paralleled the apartment buildings. Rail cranes running between the siding and the building picked apartment components right off the flat cars and placed them in the four-story structure. There wasn't any middle step.

7. There were only 10 construction workers at most on the site for the entire superstructure erection. And only three were skilled workers--the crane operator and two supervisors from L and N. The crew completed two apartments each day, ready for

Crane lifts panel right from flatcar to the building.

heating. (In the winter, this unit-construction method pays extra dividends. All remaining finish work goes on inside as the job progresses.)

8. Site clearance began in mid-February. A local contractor built the foundations. Superstructure work started in March. The first 48 apartment units were erected by the end of April and were ready for occupancy four weeks later. A second section of 68 units was started in June and followed the same schedule.

9. Housing sections at the Hamburg project are identical to the "strip" structures built in Copenhagen (see illustration page 185) but they are divided into smaller buildings. L and N took components right from the regular production runs for the job and Hamburg waived differences in the building codes to allow rapid construction.

10. Each housing section contains 24 three-room and 24 four-room apartments at 690 and 785 sq. ft. respectively. Heaviest section weighed 3.4 tons. Exterior sandwich panel walls are 6.9 inches thick, with polystyrene cores. Inside, bearing panels are 6.9 inches thick and simple partitions are 2.4 inches thick. All are a standard 8 feet 6 inches high. Floor and roof panels are a uniform 7 inches deep cast with hollow cores. Joint sealing was done with foam rubber filling and a thermoplastic caulking compound.

11. Ed.: Note the direct rail connection from factory to site which allowed for the transportation of large units and eliminated intermediate handling.

Webb, T. L.

SHRINKING AGGREGATES IN THE CONSTRUCTION INDUSTRY IN SOUTH AFRICA

National Building Research Institute, South African Council for Scientific and Industrial Research. Printed Paper. 9 pages. Illustrations. Reprinted from "Industrial Review of Africa," Volume 10, No. 10, April, 1959.

691.322 (68)

1. T. L. Webb, the Principal Research Officer, South African Council for Scientific and Industrial Research, National Building Research Institute, Pretoria, has reviewed the behaviour, characteristics and significance of shrinking aggregates for construction in South Africa. In the change from traditional methods of building to the use of cement products such studies become extremely important in making decisions about building materials.

2. It has long been realised that excessive shrinkage in cement-bonded products, such as concretes, mortars and plasters, is disadvantageous in that it leads to cracking and deterioration of structures. This phenomenon has been actively studied for many years and, in good building practice, steps are taken to reduce shrinkage as much as possible, and to reduce the consequences of such shrinkage, either by using movement joints or by designing a structure in such a way to minimise its effects. Normally, when a dry concrete becomes wet it expands by about 0.02 per cent; upon redrying the shrinkage is about the same. Its shrinkage on drying is, of course, much higher. Most of this dimensional change results from the shrinkage and expansion of the hardened cement paste in the materials: the aggregates, either stone or sand, contribute little, if any, movement.

3. EFFECTS OF USING SHRINKING AGGREGATES. The consequences of using shrinking aggregates in cement-bonded products are important and interesting. The most notable of these are deflection of structural members and deterioration of the structure.

4. Deflection of Structural Members. Reinforced concrete contains steel to provide the tensile strength required in a structure. In a normal concrete beam, such steel is introduced near the base of the member and when excessive shrinkage of the concrete takes place, the effect of the steel is to reduce the actual shrinkage of the concrete in the immediate proximity of the steel. Further away from the steel much greater shrinkage takes place and the resultant shortening of the concrete in its upper portion results in the sagging or downward deflection of the centre of the beam. The magnitude of such deflections may be quite large, e.g., deflections of two inches have been found in beams 30 feet long; cantilevers are affected in that the free end generally shows a pronounced downward movement. This phenomenon has secondary effects in that masonry built on such beams will crack, door frames distort so that doors no longer close and ceilings may buckle. These effects are illustrated on page 191.

5. Since all such movements result from changes in moisture content, they are reversible. It is of interest to observe that changes in the moisture content of the atmosphere affect such concrete member; during prolonged spells of damp weather they tend to straighten out and during dry weather the deflection increases. This effect is fairly slow since moisture transfer proceeds as a result of the concrete acquiring moisture in the form of water vapour, and this only takes place after some weeks. No evidence has been obtained to indicate that the concrete is weakened as a result of this phenomenon.

6 Deterioration of Structures. Apart from the obvious adverse effects caused by deflection, this phenomenon can result in serious deterioration of the structure which becomes apparent in a number of ways.

a. Fine cracks appear in concrete as a result of repeated cycles of wetting and drying. These permit water to penetrate and reach reinforcing steel which, even in arid areas, commences to corrode. The expansion due to the formation of voluminous corrosion products then opens up the cracks, so permitting the entry of more water, with an acceleration of the process culminating in spalling of the concrete and reduction in section of the steel. (See illustration, page 189.)

b. Repeated wetting and drying cause the formation of small cracks in a random manner. While this form of deterioration is most severe in thin cement-bonded materials such as plasters, it is also apparent on concrete surfaces, particularly where these are exposed to the weather.

c. Cracking tends to take place where there is a pronounced change of section in a cast concrete member, such as where thin fins are cast integrally with a relatively massive unit.

d. Overall shrinkage of concrete results in the opening up of expansion joints, separation of adjacent members and cracking of composite structures.

7. CHARACTERISTICS OF SHRINKING AGGREGATES. Because of the significance and widespread occurrence in Southern Africa of aggregates having these unusual effects, they have been studied in some detail. They are divided into two groups: firstly, a study of the aggregates as such and secondly, an investigation of their behaviour when bonded by Portland and other cements.

8. Study of Aggregates. Several different investigations were made to determine the significant factors in the shrinkage of aggregates. A study was carried out on the affect of clay materials in the aggregates. A number of natural aggregates were encountered in this study in which even the most sensitive techniques failed to reveal

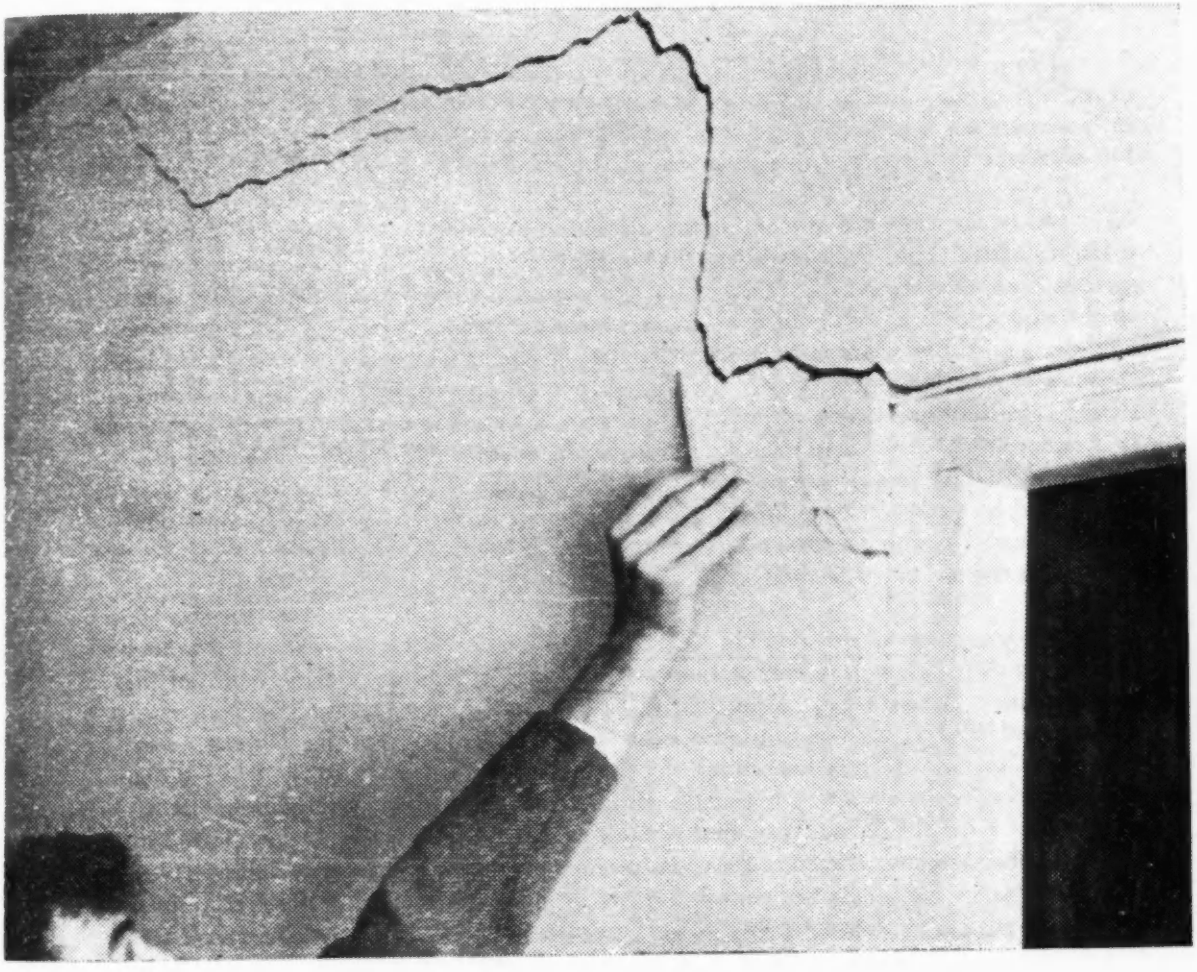


Fig. 3

Cracking of masonry due to deflection of supporting concrete beam.

the presence of shrinkage clays but which, nevertheless, showed large dimensional changes on wetting and drying. This important finding, while not eliminating the possibility that clay might be a contributory cause, or in some cases perhaps even the basic reason for the capacity to shrink on drying, showed conclusively that at least one other factor was involved.

9. The possibility that the shrinkage on drying might be due to the compression of individual particles of aggregate by the cement in the concrete was considered, as it was known that on drying pure cement paste shows considerable shrinkage. No evidence in support of this theory could be obtained however.

10. As it was known that many materials which expanded and contracted possessed a large surface area, the possibility that a relationship between shrinkage and such surface area existed, was systematically evaluated. It was found that a sound quartz sand had a total area of about two square metres per gram while a typical shrinkage aggregate sand had an area of as much as twenty square metres per gram or up to ten times as high. Such measurements, on more than 50 aggregates, indicated a consistent relationship between their surface area and their dimensional change behaviour. It is accordingly concluded that this relationship is valid and that the dimensional change behaviour or such aggregates is determined largely by their surface area. Why this should be so is not immediately apparent, but it is attributed to the dimensional change caused by the considerable chemical forces involved when water molecules are taken into the structure of the rock.

11. Study of Cement-bonded Products. It was known that cement-bonded products containing shrinking aggregates shrink on drying and expand on wetting and that this phenomenon is reversible. Consequently, their behaviour on repreated cycles of wetting and drying, such as would be experienced on exposure to the weather, was studied. Concurrently the behaviour of control specimens, identical with those containing shrinking aggregates, but made with a sound quartz sand aggregate, was examined. From this it was seen that while both sets of mortar specimens showed the expected shrinkage on drying and expansion on wetting, this effect was about five times greater in the specimens containing the shrinking sand than in those containing the quartz sand. Furthermore, the net effect of several cycles of repeated wetting and drying was an overall shrinkage, most of which took place during the first three or four cycles. When identical specimens were allowed to dry out under natural conditions over a period of some weeks in a laboratory, the shrinkage occurring was, especially in the case of the specimens containing shrinking aggregates, considerably greater than when the drying took place in an oven.

12. In the case of concretes, a different form of long term behaviour is consistently found, as can be seen in Figure 9, page 193. Here it is apparent that, while the dimensional change of the concrete containing the shrinking aggregate is again very much higher than that containing the sound aggregate, the overall effect is one of

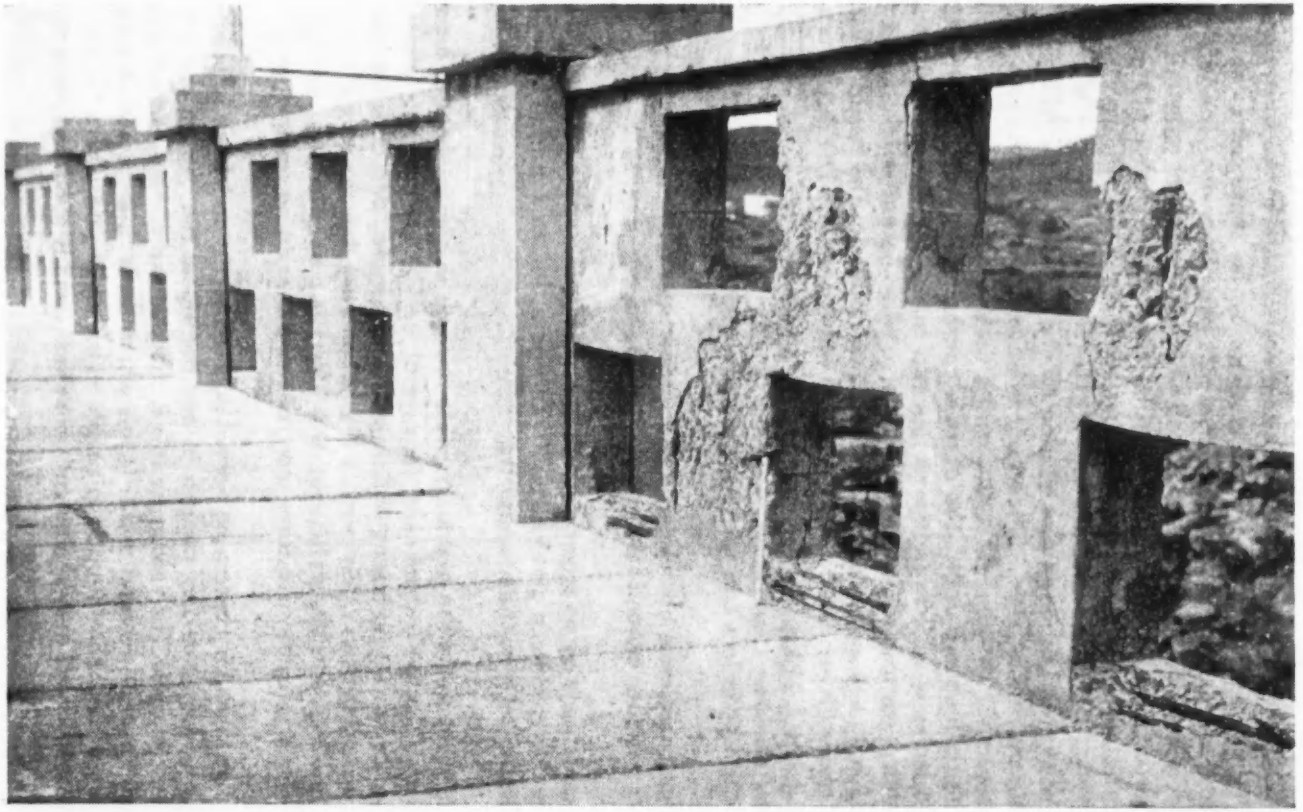


Fig. 5. Spalling of concrete due to corrosion of reinforcement resulting from excessive dimensional change caused by use of shrinking aggregate.

growth. The explanation for this apparent anomaly is considered to lie in the fact that in concrete which contains relatively large pieces of stone, shrinkage and expansion of both the aggregate and the cement paste results in the formation of small cracks in the specimen. On each subsequent cycle, these cracks do not close completely so the net effect after several cycles is one of growth. The fact that one particularly unsound aggregate was found which caused a net growth in mortar bars is attributed to the same effect, in that the dimensional change of the sand grains was sufficiently large to cause cracking.

13. The above clearly showed that wetting by contact with water and drying resulted in dimensional change. Since cement products inside a structure are frequently protected, it appeared desirable to ascertain whether changes in the humidity of the atmosphere would also cause expansion of dry cement-bonded specimens. Specimens were stored for some weeks in an environment in which the relative humidity was maintained at 20 per cent. When no further expansion took place, their length was measured and expansion calculated. The humidity was then increased to about 80 per cent. This procedure was repeated. The results are shown in Figure 10, page 193. Three conclusions can be drawn:

1) Large expansions can take place due to contact with humid air.

2) Those specimens containing higher proportions of shrinking aggregate show higher expansions.

3) Expansion is by no means proportional to humidity change, being very much larger for a given humidity change at low and at high humidities than at intermediate humidities.

14. In order to develop the highest possible strength in cement-bonded products, they should be cured by keeping them moist for several weeks after casting. Mortar specimens were made up containing both sand and shrinking aggregate, and after various curing procedures were dried out in an oven. It was apparent that the longer the specimens were cured, the higher is the shrinkage: this effect is proportionally less significant for the shrinking aggregate specimens than for those containing sound aggregates.

15. In cement products containing normal aggregates the shrinkage in practice is generally related to the cement content in that the higher the cement content, the higher is the shrinkage. The reason for this is that, as the cement content increases the water content also increases and it is this which leads to increased shrinkage. This is not true for mortars containing a typical shrinking aggregate where the shrinkage is virtually constant for all cement contents examined, and is about the same as for a specimen consisting of pure cement.

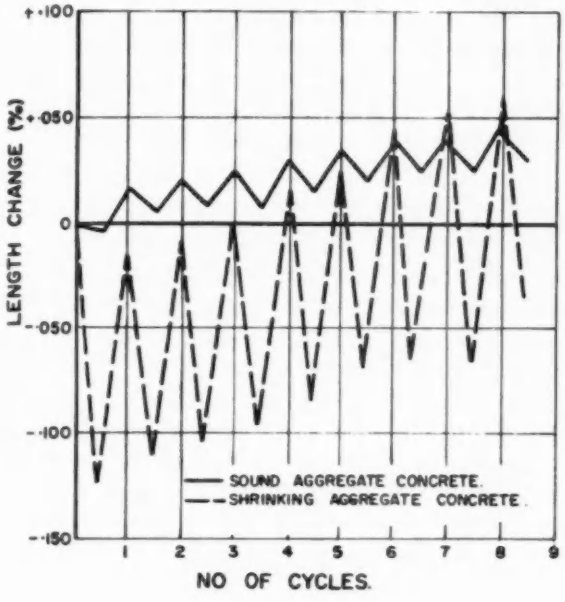


Fig. 9

Effect of cyclic treatment of concrete specimens on length change.

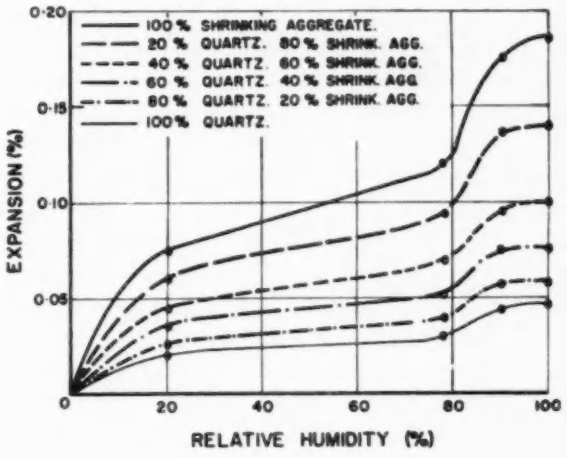


Fig. 10

Relationship between expansion and relative humidity for mortar bars containing aggregate of indicated composition.

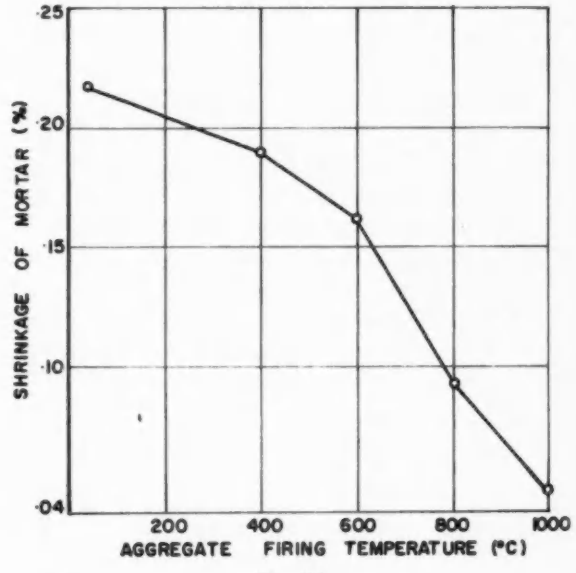


Fig. 11

Effect of firing temperature of aggregate on mortar shrinkage.

16. In certain shrinking aggregates heating to high temperatures results in the loss of their dimensional instability. The shrinkage of such mortars is shown in Figure 11, page 193. From this it is apparent that there is no sharply defined temperature above which an aggregate becomes sound, but rather that with heating the shrinkage is reduced gradually at the lower temperatures and more markedly at high temperatures. The form of this curve is significant in that, since the nature of a clay changes quite suddenly at about 600' C., a sharp reduction of shrinkage at that temperature would have identified the tested material with a clay.

17. METHODS OF OVERCOMING THE PROBLEM OF SHRINKING AGGREGATES. The possibility of rendering shrinking aggregates sound must be considered. This can, in most cases, be achieved by heating the aggregate to temperatures about 1,000' C., but the cost of this is high. The possibility of manufacturing sound aggregates of the bloated shale type should not be overlooked. While such processes, especially in areas of low population density, are unlikely to prove economic special requirements may justify them.

18. The reduction of dimensional changes by reducing moisture content changes by impervious surface coatings, is not regarded as promising or practical, and tenative attempts to reduce shrinkage of stone and sand by chemical treatment have not been successful.

19. The possibility of structural design such that either the dimensional change of cement products is reduced or its effects are controlled, is a further approach to this problem, and is being explored.

20. The most obvious, but not always practicable or economic solution, is to avoid the use of suspect aggregates.

21. The procedure recommended is the examination of any suspect or unproven aggregate. In evaluating the results, the application envisaged should always be considered, bearing in mind that the use of shrinking aggregates can have serious consequences in certain applications. In such cases it is advisable, if not essential to reduce the tendency of the concrete to shrink, and hence shrinking aggregates should not be used.

Talas, Cahit
HANDICRAFTS IN TURKEY
International Labour Review, Vol. LXXX, No. 4, October 1959. pp. 331-346.
338 (496)

1. Handicrafts and small-scale industries continue to make a useful contribution to the national income of many developing countries and more particularly to provide employment for a substantial part of their industrial labour force: yet the difficulties they face are often considerable. These difficulties as they arise in Turkey are the subject of the following article by Mr. Talas, who is Professor of Social Economy in the Faculty of Political Sciences in Ankara.

2. On the whole, there is little difference between the fortunes and the historical development of handicrafts in Turkey and in most other countries. This sector of the national economy was long neglected, and it is only over the last few years that the Government has shown any interest in it and made an attempt to bring about a recovery. A number of economic and social difficulties stand in the way of these efforts--credit, marketing, vocational training, tariff protection, selection of trades to be developed and redundancy; but before considering these problems as a whole it may be well to examine how handicrafts and small-scale industry fit into the general picture of the Turkish economy.

3. The Place of Handicrafts and Small-scale Industry. It has often been said that Turkey is a country of handicrafts and small-scale industries, and with good reason, for small factories do indeed play an important part in the economy. This is the result of a number of factors: first, Turkey is not a country with an abundance of investment capital, and the system of limited companies largely financed by small investors has not taken root; secondly, legislation has favoured handicrafts and small-scale industries by exempting them from certain taxes and social charges; and, thirdly, as a result of circumstances due to the war and to import difficulties there is a very good home market for goods produced by the country's handicraftsmen and small-scale industries.

4. The figures in Table IV show that the importance of handicrafts and small-scale industry in Turkey is increasing. Generally speaking, small-scale industry covers the following sectors: foodstuffs, furniture, mechanical engineering and electrical equipment (according to the last census about 70 per cent of the total labour in all small undertakings were employed in these sectors), the working of copper and textiles (6.3 per cent of workers in small-scale industry are employed in the manufacture of textiles).

5. Table IV. CONTRIBUTION MADE BY HANDICRAFTS AND SMALL-SCALE INDUSTRY TO THE NATIONAL INCOME

Year	No. of Workers	Gross Value of Product (Turkish pounds)	Contribution to the National Income (Turkish pounds)
1938	200,540	68,400,000	66,360,000
1948	212,120	244,360,000	233,360,000
1949	218,170	264,420,000	252,420,000
1950	225,346	263,419,000	251,400,000
1951	229,813	319,089,000	298,089,000

Source: Central Office of Statistics: Turkiye Milli Geliri (Ankara), No. 352 (1954), p. 28.

6. There are economic, social and legislative causes for the predominance of small establishments. From the economic point of view, Turkey is a country where there are no large amounts of capital available because the size of the national income does not allow substantial savings. The shortage of capital, the small volume of home demand, the tastes of consumers that vary from region to region and a relative lack of technical knowledge are factors that have promoted the development of handicrafts and small-scale industry. The social causes which have helped to promote small-scale industry are that Turks like to work on their own, that they have no long industrial tradition, and that their religious beliefs make them sober and frugal.

7. Handicraft Associations. After the collapse of the guilds, it took handicraftsmen a long time to organise in joint defence of their occupational interests and it was only when the Legislative Act concerning handicraft associations was adopted in 1949 that rapid progress was made. About 300,000 handicraftsmen, including small tradesmen, belong to the 2,312 associations formed at this time. They meet a real need by serving as effective representatives of the common interests of their members in relations with the Government and the people's banks and in protecting handicrafts within the framework of the country's general economic policy.

8. Special Economic Problems. In Turkey, as in other countries, there are various economic problems facing handicrafts and small-scale industries. First of all, the master craftsman and the small manufacturer are often threatened by competition from home and abroad, and the progess of manufacturing industry has deprived them of the market for some of their products, e.g., in the textile industry. As a result, it is becoming increasingly difficult for the State to protect handicrafts and small-scale industries. Moreover, such protection is meeting with growing opposition from large-scale industries, and is not always desirable for a country in course of industrialisation. In addition, the

extent to which customs barriers can prevent foreign competition is limited, for the State must not create a situation in which the consumer is at a disadvantage owing to excessive protection. The field for handicrafts and small-scale industries must therefore be limited to sectors in which they need have little fear of competition.

9. At the moment the handicraftsman is not a low-cost producer, and that is a very great handicap. Demand is often elastic and handicrafts and small-scale industries must therefore increase their productivity, improve the quality of their products and lower their prices. Popular taste also changes as time goes by and it is necessary to keep up with it, which calls for constant research. The distribution of the product and the estimation of effective demand require sound organisation, which is entirely lacking in handicrafts.

10. Particular Welfare Problems. At the present day the major problem for master craftsmen in Turkey is social security, of which they have none at present, because the social insurance schemes introduced since 1945 cover only wage earners. Yet a master craftsman employing a few journeymen is just as much in need of protection against the contingencies of sickness, employment injury, old age and unemployment, and his income is not sufficient to enable him to deal with such social and occupational contingencies on his own. Few studies have been made of the income of master craftsmen and small manufacturers, but sample surveys have shown that their earnings are not sufficient to give them security from want and from whatever the morrow may bring. This is why the constitutions of the handicraft associations provide for the grant of assistance in the event of sickness, death or old age of their members, as well as for other kinds of mutual assistance. As is everywhere the case, however, such voluntary measures play only an insignificant role, and a number of annual reports of the Confederation of Handicraft Associations have laid stress on the precarious situation of old master craftsmen who are retired or sick or unemployed, or who have fallen victim to other hazards involving a loss of earnings.

11. Master craftsmen and small manufacturers generally pay social security contributions on behalf of their employees. For this purpose they have to fill in a number of forms, yet they often do not know how to do so and their profits are so small that they cannot afford to keep proper books. Since, as a result, they are threatened with prosecution, they try to stay outside the scope of workers' insurance schemes by reducing the number of journeymen they employ. In addition, master craftsmen must pay the same contributions for their workers as are paid by large industrial and commercial undertakings, which constitutes a proportionately heavier burden and prevents them from building up small reserves for their retirement or for the replacement of equipment. This accounts for their constant approaches to government with a view to obtaining a measure of tax relief.

12. Vocational Training. One of the major problems associated with handicrafts is that of vocational training and occupational standards. In Turkey, as everywhere else, these were formerly organised through the guilds. Relations between master, journeyman and apprentice were defined within each trade. When the guilds went out of existence they left a gap to be filled. Except for a few general provisions concerning articles of apprenticeship, there are now no particular statutory provisions regarding vocational training and occupational standards in handicrafts. Many craftsmen who have not received adequate training take advantage of this fact and practise their trade as handicraftsmen, which is detrimental to the interests of the trade because the quality of the goods they produce is often below standard. For this reason the introduction of an establishment license attesting that the craftsman knows his trade is becoming increasingly necessary both in the interests of the consumer and in those of handicrafts generally. At the present, vocational training arrangements can be divided into three classes: (a) training in technical schools; (b) training through trade courses; and (c) training in the workshops.

13. Conclusion. It is essential that the State should assume certain responsibilities. This should take the form of establishing a legal framework to ensure orderly growth and promote higher productivity and the production of high-quality goods, while avoiding an excessive protection that would be detrimental to the consumer and the big manufacturer. The State must guide craftsmen into the trades that provide the greatest opportunities of development and that are of the greatest value for the economy as a whole. Every day new technical problems arise, and the public authorities must consider adjustments to new production processes and lend assistance as required. The formation of handicraft co-operatives, which help to eliminate middlemen from the marketing of raw materials and make it easier to obtain credit, is not less important in general state policy with regard to handicrafts. Similarly, the fair way to ensure social security for the craftsmen is for the State to lend a hand.

14. All these problems are particularly pressing ones in Turkey, and in view of the importance of handicrafts and small-scale industry in the country's economy they call for particularly careful attention. Haphazard, unco-ordinated and merely palliative action is often, if not always, doomed to failure.

Salas, Javier de and Smith, Roy J.
FARM PLOT CONSOLIDATION IN SPAIN
Land Economics, Volume XXXV, Number 4, November, 1959. Pages 356-360. Illustrations.
333.013.6 (46)

1. For economic development, it is often necessary for a country to participate in reform of the distribution of land. In the case of Spain, as reported by Javier de Salas of Madrid, and Roy J. Smith of the University of California (Los Angeles) this involved mainly the redistribution of a single holder's allotment of lands to form one plot instead of many.

2. Spanish agriculture is old and reflects conditions and policies long past. Some of these characteristics are clearly evident even to the casual observer. Every village seems to exemplify the ancient distribution of crops. Even more pronounced, in some areas, is the clear demarcation of the very small, narrow plots on which farming operations are based. The average farmer in Spain lives in a small village, and (especially in central and northwestern Spain) has his land scattered in many plots in various directions. According to data from the incomplete Spanish 1945 Cadastre (census) there were, in that year, 74,130,000 acres of farm land divided in 19,000,000 plots, an average of 3.9 acres per plot. Six plots owned by the average owner.

3. In some provinces the situation was extreme. One man owned 49.42 acres, distributed over 256 plots with an average acreage per plot of 0.193. Another man owned 44.48 acres, distributed over 202 plots with an average of 0.22 acres per plot. In the province of Burgos, one farmer had 95 plots of 0.96 acres each, for a total of 91.43 acres. These examples are extreme but they are not exceptional, and they illustrate the situation.

4. Operations on each of these small plots cannot be as efficient as on larger plots. The small plots make virtually impossible the use of much of our modern machinery. The prevalence of manual labor methods in Spanish agriculture can be laid in good part to this situation. It is impossible to maintain adequate soil conservation measures, such as contour farming, strip cropping, etc., in such small plots. This is made worse by the fact that in most sloping terrains the division of the land is always done in the direction of the slope. The land is better at the bottom of the hill; and every heir wants some of it.

5. The amount of land wasted in boundaries increases considerably in the divided plots. The percentage loss in a plot of 62 acres is estimated at 0.32. For 25 plots of 2.5 acres each, the waste is 1.61 percent. For 250 plots of 0.25 acres each, it is 5.09 percent. Disputes and lawsuits are much more prevalent in areas of extensive parceling.

6. The basic cause of this extreme parceling is that the sons of a family stay on the land and each wants his share of it. To give each a fair share of each type of soil, every plot may have to be divided. The results, over a period of centuries, clearly become serious. The importance of this inheritance factor can perhaps be best illustrated by the situation in provinces such as Aragon and Catalonia, where the law has been that of the mayorazgo (inheritance of land by the eldest son) and where excessive parceling does not appear in serious proportions. The cause of this extreme parceling, is the relatively slow industrialization process in Spain and the absence of any extensive movement in recent years to the countries of the new world. In consequence, where there are several sons in a family, they frequently, by necessity, have had to depend on their father's holdings for a living.

7. Most Spanish governments when they attempted to do anything about land, have tried to parcel out the large estates of the South. A program promoted by the present government, the National Colonization Institute, has established around 40,000 small farmers on these large estates. Since 1950, however, it has also attempted to do something about the excessive fragmentation problem. Naturally, it has had to proceed slowly and carefully. The first step was to create a Land Consolidation service (December 20, 1952). To date, it has started projects on a total of 2,860,000 acres. The International Cooperation Administration first appropriated 25 million pesetas ($400,000) then 39 million more ($576,000), and recently another 50 million ($800,000). The program is now being carried on at a rate of 120,000 acres a year.

8. The maps (pages 201 and 203) illustrate very well the problems and the program. They show the situation in the zone of Cantalapiedra in Salamanca Province before and after consolidation. It is the first zone where land consolidation was completed. Beforehand there were 5,581 parcels of 2.8 acres each divided among 330 proprietors. The average ownership included 16.9 parcels. After consolidation the 330 proprietors gathered their land into a total of 474 parcels, or 1.4 parcels per owner. Beforehand there had been a total of 2,625 enclaves, parcels completely separated from other parcels of an owner by intervening properties. Afterward there were only 13 such enclaves.

9. The procedure by which consolidation is brought about is necessarily slow. The steps may be outlined as follows:

a. A petition for consolidation is presented representing at least sixty percent of the owners and sixty percent of the land.

b. A preliminary report is published.

c. The proposal is approved by the Land Consolidation Service.

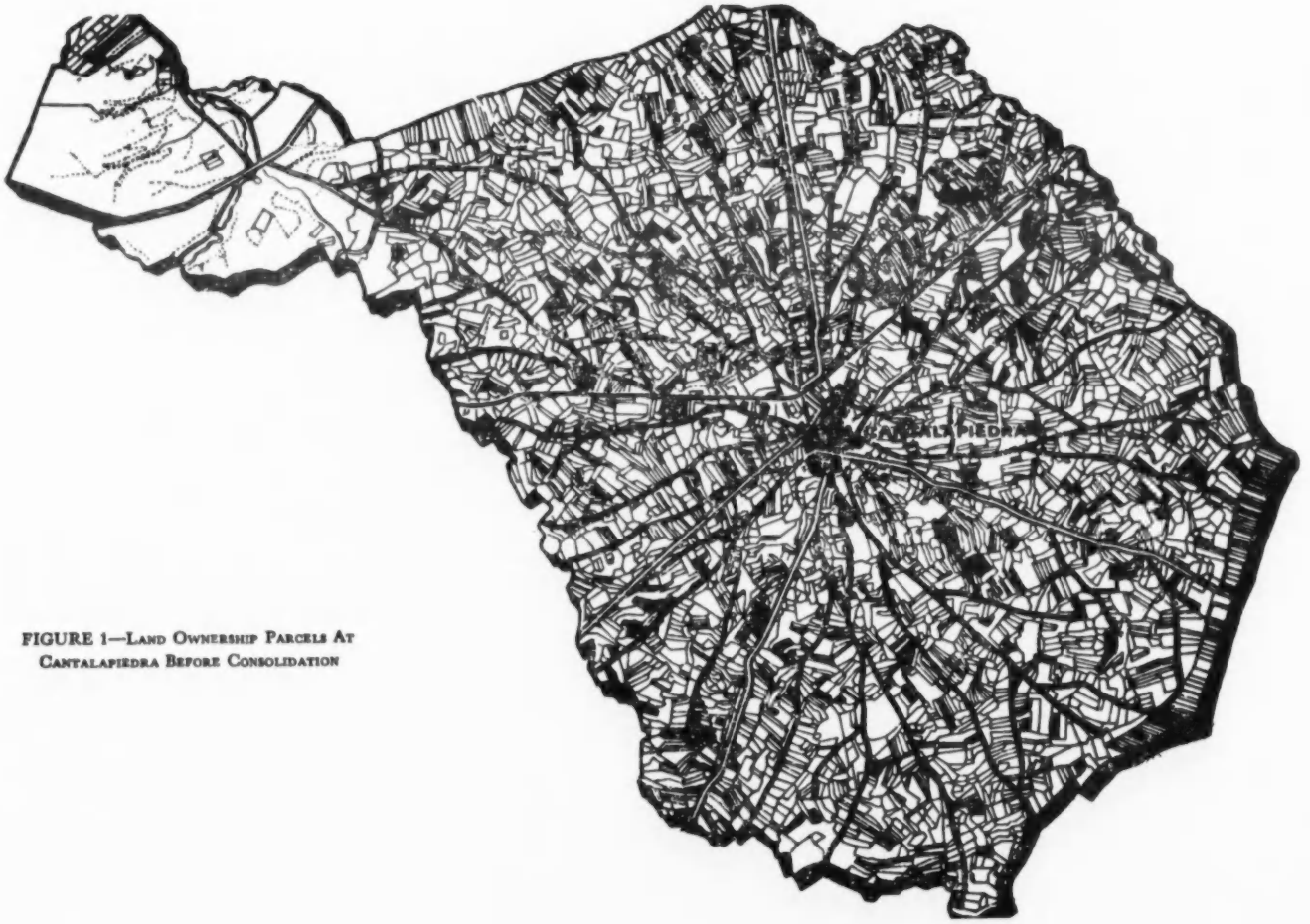


FIGURE 1—Land Ownership Parcels At Cantalapiedra Before Consolidation

d. Owners study the proposal.

e. Property not to be included in the consolidation is determined.

f. Land is classified and evaluated.

g. Interested parties present their views.

h. Formal agreement presented by the Local Commission of the Land Consolidation Service.

i. Appeals presented to the Local Commission.

j. Decision made by Local Commission as to these appeals.

k. Appeals made to the highest authority (Ministry of Agriculture).

l. Final decision of the Ministry of Agriculture.

10. The most difficult phase of the program is education of the people in each community. Moreover, it is continuous. The Land Consolidation Service presents its arguments by every means. It must arouse interest, explain, and justify. Each step must be understood by everyone. The individual owners referred to above are fairly large owners and so are more apt to have the background to understand and have the financial means to undertake change. This type of situation must be sought out. By means of brochures, articles, talks, visits, movies, etc., support is drawn to the program.

11. To a man engaged in farm management the potential of these changes in terms of greater productivity and lower costs is obvious. Other aspects, however, are less clear. While the consolidation of holdings will encourage the use of mechanical power and equipment, it will also reduce the need for manual labor. Is the economic development in Spain, or in this particular area, such as to offer alternative employment? One can visualize some use of such labor in the continuing consolidation program but eventually new occupational employment must be opened.

12. Another important management opportunity with consolidation lies in the use of new crop programs and practices. Such changes lie not only in the size of plot but also in the independence offered each proprietor. In the past the intermixture of parcels was designed to prevent change or experiment because of custom and the impracticality of one man changing without others doing the same. Will the agriculturalists rise to this new opportunity?

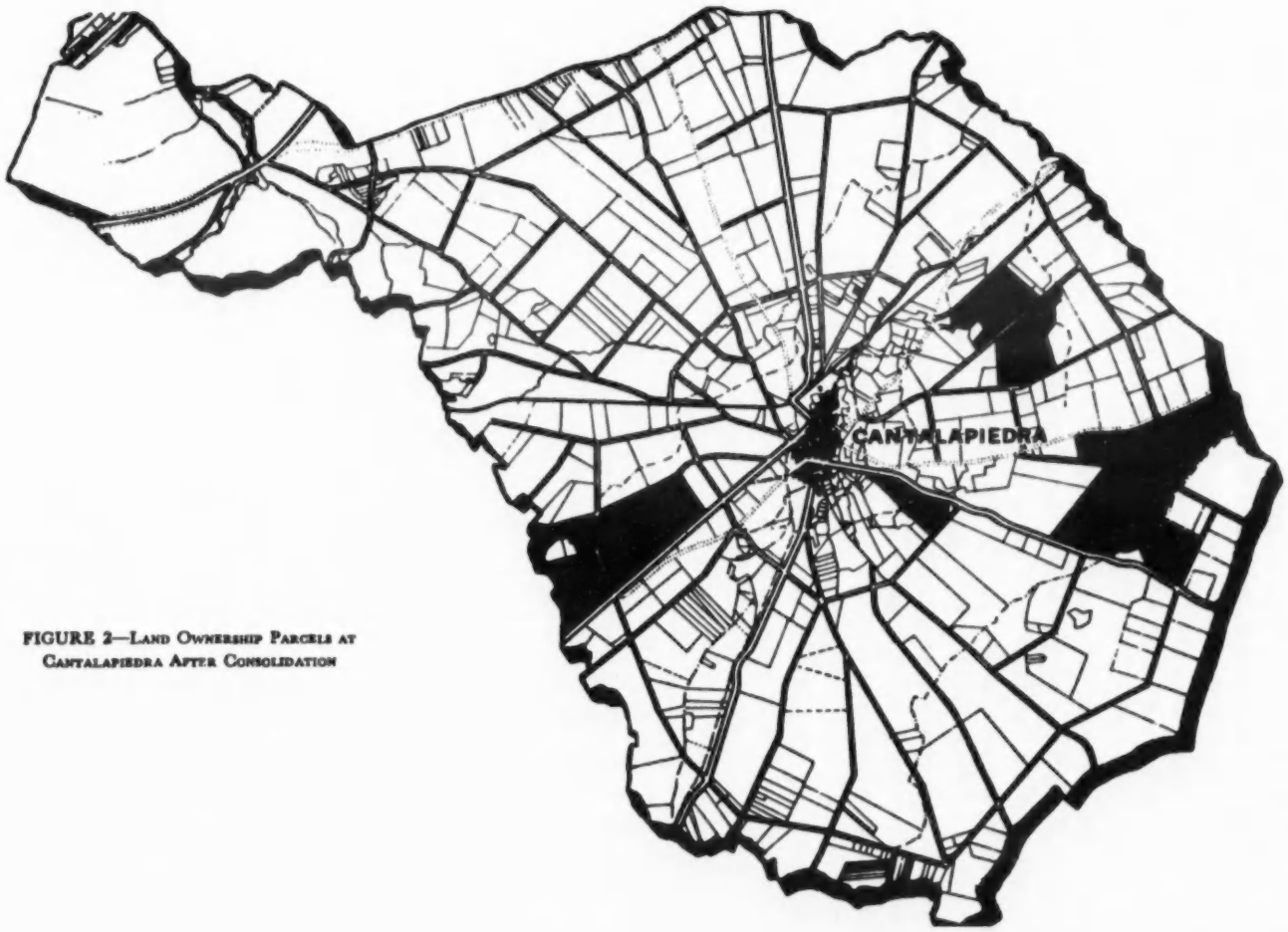


FIGURE 2—Land Ownership Parcels at Cantalapiedra After Consolidation

13. Will fractionalization be resumed? Might the law of the mayorazgo be extended? Are there other legal means to prevent excessive division? The large estates of the South indicate that the problem is not simply one of preventing division. It would seem that some thoroughgoing studies and imaginative thinking along this line would be desirable. Might the old tendency toward fractionalization be counterbalanced by the onrush of modern mechanization and the lure of the cities?

14. Can the program proceed until the problem is solved on a national basis? Continuous success in each successive consolidation venture will do much to assure continuation but, even so, will the national will and the support of the land owners continue to be forthcoming? In the specific ownership cases cited, the owners had considerable property which may have done much to make success possible. Where many very small owners dominate a community, will they be too lethargic to support such a change? For the time being, however, real progress appears to be underway. The ultimate end may be watched for with great interest.

Ciriacy-Wantrup. S. V.
PHILOSOPHY AND OBJECTIVES OF WATERSHED DEVELOPMENT
Land Economics, Vol. XXXV, No. 3, August, 1959. pp. 211-221
627.15 (100)

1. S. V. Ciriacy-Wantrup is Professor of Agricultural Economics at the University of California, Berkeley, California, and on the Giannini Foundation. He originally presented this article as the lead-off paper of the Symposium on Economics of Watershed Planning which was held at Knoxville, Tennessee, in June, 1959. In describing the purpose of the Symposium, Professor Tolly, the Chairman, writes: "The Symposium was an occasion for representatives of public agencies and universities to take stock of watershed development. It gave a picture of present development and planning procedures and searched for guides to the following: reglation of watershed planning to overall resources development; potential extent of watershed development; the watershed as an entity for planning; procedures of interdisciplinary project planning teams; data improvement; original research reports on programming and other mathematical techniques as planning aids; political and legal problems in watershed development; and survey of persons of experience on possibilities for improving watershed development."

2. The Watershed as a Unit in the Social Sciences. A watershed has clear conceptual unity in hydrology, physical geography, and other natural sciences. This does not mean that, as a corollary, a watershed is also a logical unit for understanding and policy making in a social science context. There are many examples in the past and present when large and small rivers and swampy valleys have been boundary lines and barriers to social intercourse rather than arteries of communication and the lines to which settlement gravitates. Frequently, the upstream part of a watershed is occupied by a social group different from the one occupying the downstream part; and political boundaries bisect watersheds at the piedmont zone. In some parts of the world the struggle between lowland people and mountain people has continued for centuries.

3. As a proposition, I should like to submit that the watershed has emerged rather recently in the social sciences as a unit of understanding and policy making. This emergence appears closely connected with technological change and with shifting demands for the main products of a watershed in the course of general economic development.

4. The most significant technological change I have in mind was the discovery of large-scale uses for electric energy and of the role of falling water in producing such energy. The second change was the invention--or rediscovery--of concrete and of its reinforcement through steel rods. These two changes made high dams both technologically possible and economically feasible. The experience with the construction of high concrete dams, together with the development of large earth-moving

machines powered by gasoline and diesel engines, led to the use of high earth-filled dams where they were cheaper or more suitable--for example, in earthquake areas--than concrete dams. All these technological changes took place during the last quarter of the nineteenth and the first quarter of the twentieth centuries. During this same period, and related to these changes, the demand for the main products of a watershed--hydroelectric power, water, timber, livestock, agricultural crops, and recreation--increased greatly. This increase in turn gave new significance to the control of floods, to soil erosion, to sedimentation of reservoirs and canals, to salinity, and to drainage--in other words, to the pervasive problems of water-quality, in contrast to water-quantity management. Water-quality management becomes increasingly important as the demand for products of watersheds increases. This is a special case of the over-all problem of waste disposal when a population of organisms increases in size and density. The atomic age will pose this problem on a gigantic scale. These physical and economic interrelations force considerations of the watershed as a unit in economic understanding and policy.

5. From this sketch of the emergence of the watershed as a concept in the social sciences, two important conclusions may be drawn. First, the physical and economic interrelations that make the watershed a unit in the social sciences operate largely on the side of production and not on the side of consumption. Consumption of the products of a watershed may take place largely outside of it, and such consumption need not be interrelated. To regard a watershed as a unit in consumption is not required by the physical and economic inter-relations just observed. Policies based on this misconception may hinder rather than facilitate watershed development.

6. My second conclusion is that a watershed as a helpful conceptual unit in the social sciences is not immutable. It is a concept of economic dynamics and not statics. By dynamics I do not mean reference to time merely by dating, but an explicit consideration of changes in technology, preferences, and institutions. In the same way that the concept of a watershed has emerged in the social sciences in the course of technological and general economic change, so its significance may well be affected by similar changes in the future. Let me illustrate. A presently foreseeable technological change that may have such results is artificial modification of precipitation. In weather-making, a single watershed, even of large size, may not be an appropriate unit for understanding and policy making. The boundaries of individual watersheds, which may be different for surface and ground water, change over time through geologic forces and drastic action by man.

7. At this point it may be objected that the self-sufficient irrigation cultures, which have existed in many parts of the world during long periods of history, prove the watershed concept of early origin, static over time and including inter-relations in consumption as well as production. It may be well, therefore, to note in passing that existing knowledge about the early irrigation cultures tends to confirm my proposition and conclusions. In these cultures the modern watershed concept did not exist and this absence may well be related to some of the difficulties they encountered.

8. The early irrigation cultures were located in the alluvial plains of major river basins. They relied on periodic flooding and low diversion dams. Levees and water distribution systems were highly developed; but high storage dams, upstream water management, especially quality management, such as silt control, salinity control, and drainage, were absent. It is quite possible that the physical difficulties caused by this absence were not the only ones and that the actual destruction of some irrigation cultures were caused by military attack from outside. But such an attack came generally from the less civilized people, the "barbarians" in the upper watershed, attracted by relatively high economic development downstream. In this sense, one may regard such attacks as a consequence of the absence of economic and political unity in the watershed.

9. Watershed Policy and Watershed Projects. When tracing the emergence of the watershed as a unit in the social sciences, I referred to public policy rather than public projects. The difference between watershed policy and watershed projects is not merely semantic but highly important conceptually and operationally. The economics of watershed projects--for example, benefit-cost analysis and other quantitative techniques for evaluating such projects--comprises only a segment, and sometimes only a small segment, of the economics of watershed policy. In such project analyses, significant aspects of watershed policy are mentioned, if at all, as "institutional constraints." I should like to submit that variation of such constraints (in other words, whether they are means or obstacles of social welfare) is one of the most important aspects of the economics of watershed development.

10. Objectives and Criteria of Watershed Policy. In proceeding now to the objectives of watershed policy one encounters what might be called the problem of unity of social objectives and criteria. The objectives of watershed policy cannot, in principle, be divorced from those of other economic policies. Such objectives are interrelated. Social welfare criteria are no different in watershed policy than anywhere else.

11. Economists have taken special interest in optimizing social welfare and in the criteria for such optimizing. Optima of social welfare and formal criteria for optimizing are "constructs" in the sense of useful scientific fictions. Optimizing is not and cannot be an actual policy objective.

12. For policy decisions of more limited scope--for example, evaluating individual watershed projects--incremental improvements in social welfare can be determined cardinally. This may be done by comparing hypothetical changes of aggregate national and regional income that can be attributed to alternative projects or parts of them. For policy decisions of broader scope, incremental improvements in social welfare can be appraised only ordinally in terms of directions of changes, the relative speed of changes, and their sequence in time.

13. It is important for public policy to know whether an observed or planned change sets in motion corrective counter-changes tending over time toward a balance of the initial change, or whether a change sets in motion other changes that are circular and cumulative and tend to reinforce the initial change. There is, for example, evidence that in the United States during the last fifty years relations between prices of land, prices of agricultural inputs other than land, and technological change in agriculture can be regarded as a corrective system. There is also evidence that the relation between soil erosion, income, population, and technology is frequently such a system. Such a system, if operating in the upstream portion of watersheds, has physical and economic consequences downstream which have circular and cumulative effects upon the whole watershed.

14. Watershed policy may well make allowance for the risks involved in this circular and cumulative system. Such allowance cannot be made by adding a few percent to the interest rate used in benefit-cost analysis. Rather, the approach is that of establishing minimum standards in resource use through a variety of institutional approaches. In this way, allowance for uncertainty is built into the formulation of policy objectives itself. For the pursuit of such objectives, benefit-cost analysis and relative quantitative techniques must be supplemented by a type of analysis that takes cognizance of research in economic history, in the sociology of value systems, and in the change of social institutions, especially the law. This type of analysis relies heavily on theory but not on economic theory alone; it focuses on time and uncertainty economics but not necessarily through increasing the number of variables and equations in optimizing.

United Nations

APPROACHES TO COMMUNITY DEVELOPMENT IN URBAN AREAS IN ASIA AND AFRICA

United Nations Series on Community Development, United Nations, New York, July, 1959. Mimeographed. 19 pages.

711.437 (5) (6)

1. This number of the United Nations Community Development Series deals with the need for field projects and pilot studies, and the recording and analysis of their methods and results; and material for use in training persons concerned with urban problems and community development.

2. Community development acts through institutions--the institutions through which local people work together for their common purposes and the institutions through which they relate to a wider community. It may begin either with people's local efforts or with the efforts made by agents of a wider community, even though both of these approaches have to come together before they answer to the two-sided definition of community development. In this paper, both approaches are illustrated, even though they are not always brought together in a conscious community development programme.

3. The present paper is limited to reviewing available information in order to begin to analyse factors and pose questions which it might be useful to take into account in the further exploration of the problem of the applicability of community development principles and programmes in urban areas.

4. The following are among the questions which might already be tentatively posed:

a) What is the area covered by urban mutual-aid activities? Is it the whole city, or a municipal ward, or some still smaller area such as a registration quarter, a school district, or a neighbourhood as envisaged in the city's master plan? How does this primary territorial organization relate to the other typically urban organizations for mutual aid through city-wide secondary groupings along ethnic, functional or vocational lines?

b) Who are the people who promote community development in urban settings, welcoming and stimulating and complementing the action of the local population and their leaders? Are they officials, volunteers, business managers or unofficial leaders drawn from a wider community? How far, and by what means have governmental organs, and especially municipal authorities, enlisted popular participation in civic effort?

c) What are the wants and needs which urban populations seek to meet and how do they try to meet them? How far do they meet their needs by their own efforts, and how far by impressing on local or central governmental organs their claims to equal public services? How far are their social and civic activities balanced by economic action at the same level of organization?

AFRICA

5. In the BELGIAN CONGO, at Léopoldville, in-migrants have tended since about 1945 to become urbanized, to the extent of establishing families there, instead of regarding it merely as a place when men can earn livings for a while in unaccustomed ways, as wageearners or self-employed small businessmen. At the same time, they have settled in neighbourhoods composed of families with many different tribal backgrounds, partly because they have to take any compound they can find, and partly because the authorities have not taken account of ethnic affiliations when leasing compounds; on the contrary, the rack-renting of huts on compounds makes neighbours out of persons of different ethnic origin, religion, education and occupation; women nevertheless cook together, and renters help one another and attend one another's celebrations. Moreover they have formed a number of voluntary associations, including namesakes' mutual aid clubs which meet frequently at the houses of their richer members; mutual aid societies of persons from some but not all tribes; and athletic and musical clubs; for the authorities have encouraged the formation of clubs other than ethnic. Community facilities, such as schools and recreational opportunities, have been widely provided through religious missions, with particular attention to young peoples' needs and organizations. Appointive chefs de quartiers have enforced the law within their quarters, but have customarily worked through tribal and occupational headmen unknown to the law.

6. In the Republic of the CONGO, Brazzaville includes two village-like extensions inhabited by African in-migrants from the Lower and Upper Congo respectively. Each is managed by an administrateur délégué, under whom are chefs de quartiers. Neither the quarters nor the blocks into which they are subdivided have any ethnic unity; and when a chef de quartier settles disputes, he has to call in assessors from the different tribes. A number of different kinds of membership associations have begun to appear, which are tolerated by the administration, and in some cases registered by it, but which are not systematically associated with it in its work. These include numerous mutual savings societies among people whose similarity of tribal background gives them confidence in one another; a few small associations d'originaires, composed usually of minor government clerks from the same place or tribe; and recreational societies composed of people of similar interests living in the same vicinity. There are also some municipally-aided non-governmental organizations, which provide centres culturels, sports grounds, women's workshops, dispensaries, home economics courses, etc.; these however have been less studied than the membership associations and other relationships which have grown up spontaneously among the African population.

7. GHANA has at Accra a number of forms of organization of mutual aid. Among illiterate newcomers, two are particularly prevalent. Tribesmen from the remoter areas tend to have chiefs with such customary functions as settlement of disputes, maintenance of ceremonials and burial of the dead, as well as helping the authorities by standing surety and serving as court assessors: most of these chiefs function informally, but a score of them have been registered with the authorities. Secondly, recently urbanized people also tend to form tribal or home-town associations, of which nearly one hundred are known with a membership equal to about half the adult male population; although aimed at improvement of their place of origin, they are in fact concerned mainly with mutual aid. Most important, however, especially among the more urbanized inhabitants, are the sixty-seven mutual benefit associations, of which three-quarters of the adult women are members; their regular dues and special contributions not only provide help in bereavement and childbirth, but also enable all the women in turn to obtain considerable sums of money without borrowing. City-wide "community centres" were built in Accra and other urban areas, from 1947 on; but by 1956 they were giving place to "neighbourhood centres" of which there were then eleven (3 in Accra). The difference was that the latter had smaller premises and served smaller areas, and their members were not individuals but associations which paid affiliation fees and were represented on the management committee. Each would have a resident warden paid for by the Community Development Department.

8. It was decided in 1950 that services for specific categories such as school children, sick people, and wage earners, needed to be supplemented with a "global" approach for the people in the growing city of Abidjan, REPUBLIC OF THE IVORY COAST (French Community). This approach aimed at touching the basic motivations of the whole population, so as to help them to adapt to their new urban milieu, and also adapt the milieu to its new inhabitants. It was considered that the key to African advancement lay in women's fundamental education, especially in health, home economics, and child care. Therefore a number of women's centres sociaux were established. By 1955, they were staffed by more than 30 women workers who have been in contact with many people. Among non-governmental agencies, a prominent role is played by la Goumbe, a Muslim, and predominantly Dioula, youth organization for both sexes, which combines the functions of emancipating young women from family influence, assisting marital selection, providing on a contributing basis marriage and maternity benefits, preserving the Dioula tribal spirit, running a local orchestra, acting as propaganda agent for a political party and maintaining a police force.

9. In KENYA, centres in different neighbourhoods of Nairobi have been built by churches of various denominations. A social survey of Mambasa in 1956 was promoted by the Ministry for African Affairs, about £3,000 being contributed by the local authority, trade unions, and employers' associations, and about £5,000 by the Ministry. The Development Fund, as part of its 3 1/2 year plan for increasing the gross national product, has set up revolving funds to enable local

government bodies to construct roads, drains, sewers and water supply, and also housing. Social surveys have shown that at Nairobi and Mombasa, occupational divisions tend to coincide with ethnic ones. There are more than sixty registered African associations which tend to organize initially on the basis of tribal membership or place of origin, but later become trade protection societies.

10. In NIGERIA, sub-tribal "progressive unions" organized by younger and more educated persons of the Eastern Region in order to promote education and other improvements in their areas, usually have branches in each of the main urban areas of the Federations. Besides helping their people back home, these branches have provided mutual aid for their members in time of trouble, and kept alive tribal customs and traditions, provided schools and scholarships, and been used as bases for selecting members of official boards and councils.

11. In the Federation of RHODESIA and NYASALAND, business concerns at Broken Hill (Northern Rhodesia) attempted to stabilize their labour by providing company compounds, company small holdings, and low-cost public housing, as well as markets and recreational facilities; but practically all their workers become only "temporary townsfolk" and regard their place of origin as their home. Small groups of neighbouring families cook and eat together, thus providing a kind of insurance against temporary unemployment and the absence or sickness of a wife; and groups of unmarried men similarly eat and sleep together. Workmates also pool their salaries so as to guard against frittering them away and help one another to make the larger purchases such as clothes. At Luanshya, in the copperbelt, the mining company established in 1931 a system of "tribal elders," selected by fellow tribesmen and by the native authorities back home by virtue of their high rank in the tribe. Their duties were to settle disputes, advise on domestic and other problems and help newcomers get adjusted. In the main township, this broke down in the 1940's because problems of labour relations made the position of such an intermediary intolerable; but in the government township occupied by non-mine workers it remained useful until 1953 when the district commissioner's urban advisors council was made elective and an elective "urban housing board" was set up to advise on such matters as water-supply, heating, etc. By that time educated Africans were available for election, owing to the rise of membership societies such as clerks' associations, boss boys' committees, and especially "native welfare associations" which came together into a Federation of Welfare Societies, which in turn gave way to an African National Congress. This new leadership, able to think in terms of new needs, was found among men whose education and occupations differentiated them permanently from tribal elders; and their election in preference to the elders indicated general awareness of this difference. Domestic relationships however evolved less rapidly than employment relationships and urban service needs.

12. In SIERRA LEONE, there has been considerable immigration from tribal areas into Creole Freetown. The newcomers no longer necessarily congregate in tribal neighbourhoods; they nevertheless continue organized in tribal sections, each under a headman

recognized by the tribal chief back home, the Government and the municipal corporation. All of these tribal headmen take responsibility particularly for settling disputes regarding family relationships, the extent of their jurisdiction being determined as much by custom as by law; and proposals to substitute elective ward headmen to sit in ward courts with tribal assessors have been rejected owing to the prevailing diversity of customs and languages. Immigrants from one Muslim tribe have organized a fraternal society which in turn has elected a "village headman," a settler of family disputes, and a religious headman. In-migrants from a trading tribe have organized a society for making loans to their members, and clan subsidiaries for paying funeral benefits. One in-migrant headman has started evening literacy classes, an agricultural settlement for unemployed fellow tribesmen, and a service to clothe fellow tribesmen who get shipwrecked on the coast of his quarter. In the next generation, a new structure of roles and status is embodied in a special kind of voluntary association--the young peoples' "companies," which combine entertainment with mutual aid. Although still drawn from members of the same tribe, they constitute an innovation, in that social groupings by age are not characteristic of tribes in this area, prestige in the companies is based on competition rather than status, the companies are based on sex equality, and they build schools and mosques for their people. They thus represent an important instrument for the reorganization and adaptation to urban life of what might have become a disorganized mass of detribalized people. They spring from the initiative of the people themselves; and there seem to have been little positive effort to relate them to the provision of modern services.

ASIA

13. In HONG KONG it has become customary for well-established Chinese residents to organize Kaifong ("streets in square") or neighbourhood associations, and this has been all the easier in that members of the same clan have customarily settled in the same neighbourhood. The associations lapsed in 1941-49 because of the war, but then were revived. The Government's Social Welfare Office has recognized 23 of these non-governmental bodies, with 41,000 member families (317,000 persons), by 1956. In the Social Welfare Office they were originally dealt with by the Relief Section; this took the title "Relief and Community Development" in 1952; and only in 1956 were the two activities separated. In such emergencies as fires--which were both frequent and extensive--floods, landslides, sinking of junks or collapse of houses, the local neighbourhood association would become the nucleus for an ad hoc non-governmental Relief Committee through which the collection and distribution of rice, utensils, clothing and cash could be co-ordinated. Each neighbourhood association helped on the average 1-2,000 disaster-stricken persons each year. It has become normal for each of them to have its free school, free clinic, recreational facilities, besides referring persons to other agencies, helping them to get jobs, providing free coffins, and acting as a two-way communication channel between the neighbourhood and the Social Welfare Office and other governmental departments. Most associations have had Women's Sections, to ensure maternity care, organize home economics classes, etc.; and in 1955 three succeeded in organizing Women's Welfare Clubs

whose members themselves participate in teaching and fund-raising dramatic performances, instead of hiring teachers or actors as had hitherto been customary. It should be particularly noticed that the initiative has come from the people rather than the Government; that the people's organizations are territorial rather than familial, and that the Government has encouraged this form of community self-help.

14. In IRAQ a United Nations community development expert, attached to the Ministry of Social Affairs 1955-56, gave technical assistance in connexion not only with rural community development, but also with community facilities and organization in a low-income housing project and surrounding slum at Tal Muhammad in the periphery of Baghdad. After making a survey of low-income families of non-Baghdad origin living in mud-dwelling within the urban area, and discussing it among officials of the various ministries, the Ministry of Social Affairs authorized the establishment of three community centres. The first was officially opened in September 1957 at Shaykh Omar. The Ministry also authorized a pilot project in community development in an urban area, and selected this centre as headquarters for the Community Development pilot project. Reports show that certain government services including a community centre, a primary school, and a dispensary are all contributing to the social development of this urban pilot project in community development. The first important self-help activities took the form of a "cleaning day," on which most houses and fourteen streets were cleaned; a prize was awarded by a local selection committee to the house adjudged to be the cleanest in the area; and the day concluded with a play, other activities and refreshments.

15. In the Republic of VIET-NAM, certain community development principles have been applied in interim measures taken in one of the quarters of Saigon. Several thousand families have erected pile dwellings over a marsh which serves them as a sewer, (this is zoned for industry related to the port and slated to be filled in). In order to facilitate police circulation, the prefecture decided to construct an all-weather trail, above flood level, through the heart of the settlement. With a representative committee a trail was traced to link the market pagodas, school, and public faucets. Male inhabitants provided the labor and the municipality provided dirt, paving slabs, transport and technical assistance.

Lyon, Peter
HOLLOW CITIES
Industrial Architecture, Vol. 2, No. 4, September-October 1959,
Pages 262-266. Illustrations.
711.41 (100)

1. The January, 1960, EKISTICS focused on the major problems and new forms suggested for the modern city. This month Peter Lyon has made suggestions in regard to the future of the city from the point of view of the present desires and possibilities for the living pattern of man.

2. Every form of human activity has its centre or meeting place and whether it is Parliament or a pub the building and the people who use it soon come to share a joint personality. The atmosphere of the building will make its own contribution to the life of its owners. The physical structure of a building will aid the growth of customs and traditions which are the machinery for discussion and function.

3. This mutual growth of institution and building can be seen all round us; pompous men build pompous buildings, dictators build cardboard structures of Olympic proportions while men with less pretension devise shapes more suited to human beings.

4. When many meeting places come together, perhaps jostling each other none in direct sympathy with its neighbour but together forming a unity we get a city. No true city has yet been planned (though some have been redesigned after the initial growth). A city is formed not round a single nucleus, though it may start as a port or a market place. Until it has a complexity of centres it cannot make a claim to that inexplicable character and dignity which makes a city.

5. The city is a natural expression of man for it becomes the focal point of his gregarious nature. However reluctant a man may be to live in the city himself, however much he may cherish the country, he must always turn to the city for the ultimate decisions in his business. The farmer is affected by the markets of the city and by the policy of the Government which is centred there; even the artist and the writer must show their wares in the city.

6. It is strange that the city, which is such a distinctive creation of man, should be imperilled by the very factors which brought it into being. The cities could not grow without efficient transport and communications, there had to be substantial national and international trade to support the markets. The resulting prosperity allowed the building of churches, workshops and a thousand other structures to house the creeds and philosophies, fashions and conceits which are distilled in the city and which spread its influence through the country which surrounds it and sometimes throughout the world. But now the very efficiency of transport and communications which brought men together in the cities is now as efficiently dispersing them.

7. Businesses have realized that modern techniques of production assisted by the speed of transport and communications, allow the building of factories on cheaper ground in the country and labour can be drawn locally. Housing estates are built (for they are the cheapest way of providing living accommodation) and a new district grows up with the character of a suburb without its proximity to the city. There are many ways of making this development sound attractive and it is in the interest of business and the Government to do so. There are the obvious advantages of the country as a place to live in, children have fresh air and reasonable places to play, there is less dirt and on the whole life is cheaper. It is hoped that a community spirit will grow (though this is not always achieved by the building of a "community centre" and a picture palace) and there can always be the day trip to "town." The picture can be made to look very rosy, even within the scope of ordinary business expansion.

8. Planning today has become increasingly conscious of human interests and values. The rigid patterns formed by the roadways of the older housing estates have given way to the deliberately casual arrangement of housing which gives the feeling, though perhaps illusionary, of each village or neighbourhood so formed having a distinctiveness of its own.

9. Though these new townships have helped to restore the human dignity of many of the people who have gone to live in them—people who came from the overcrowded tenements and slums, unable to entertain even the ambition of living in a house which possessed a bathroom and separate bedrooms—they do not compensate the nation for its declining cities.

10. The considerable social change which is now taking place, and which is as yet insufficiently recognized, is based on the new advantages introduced by technical development and has economic explanation. But the quasi-science of economics should not be the influence and directive to society; it should remain the tool for the understanding of the commercial and industrial structures within society.

11. The car, supported by other forms of transport, has made the familiar pattern of community life, rural, village, town and city, unnecessary for most practical purposes. By using his car, the individual can buy all the goods he requires in a large number of different centres. He is in no sense limited to the services of his local shops. He has equally wide range of facilities for his other interests. Sports, theatres, and art galleries he does not expect, or want, to find on his own doorstep. When he feels like enjoying these he goes to the appropriate centre where he finds the biggest and the best.

12. Self-contained units. The individual has become a self-contained unit more widely linked than ever before to the rest of the nation by television and the daily press and yet almost completely independent of his own immediate locality. But this new found independence applies to his greater freedom of choice only, his personal influence has been diminished. The television, the daily press and the

BELOW: *The old town of Chester bursts at the seams as it carries modern traffic along streets designed for horses and pedestrians.*
The skilful proportioning of space and building of the mediaeval square in the righthand picture could also be lost with the help of a few double decker buses and a lorry or two.

nationally marketed products are one way services. As far as the individual is concerned, he can choose what he wants from the range offered but as a person he is without influence in these matters. It is true that the sum total of individuals exert a considerable influence, but only in so far as they represent units on a consumer graph.

13. It is arguable on certain grounds that the changes which are taking place are for the better. Why should people crowd together to live when there is so much room? Also why should buildings be crowded together when they represent entirely different activities of man, activities which may not even be in agreement with each other. Why not use different localities for different interests? Ship building may have to be near a convenient river, but there is no reason, with modern transport, why people should live there or why there should be theatres, offices or playing fields. All these things can be fifty miles away without in any way impairing the efficiency of the ship building. In fact it might result in even greater efficiency in the ship building because there would not be so many things in the way.

14. The logical development of this is clear. There could be areas devoted to all the different jobs, places to play in, places to eat in and drink in. The economic advantages of specialization apply to the land and to the buildings as much as they do to tools and people. The zoning of different activities is not new, it has come naturally to most cities themselves when they have become large enough. Piccadilly has the restaurants and the entertainments. The cheaper shops are in Oxford Street and the most expensive on Bond Street. Stockbrokers work round the Stock Exchange and jewelers gather round Hatton Garden. People in similar trades have naturally gathered together and many of the streets of London with their distinctive professions illustrate this.

15. But such specialist areas that there are in London are never solely in the hands of the specialist, for there are always other interests represented as well, in the same streets and in the same buildings. London is not split up by the many ingredients which have gone to form it, they flavour it and colour it, but no single factor ever dominates the true city.

16. In the hard worlds of commerce and industry there may seem to be no place for such romantic concepts as the "city." But although the city may elude precise definition it remains an essential factor in maintaining the balance in human communal life. There has never perhaps been a time when the digestive processes of the city were needed more to cope with the complexity of technical advancement and its effect on human life.

17. Question of social prestige. Purely social custom is now contributing to the fall of the cities. The higher income groups tend to avoid them, using them merely to dip into for entertainment or an occasional social function. It is of social prestige

Houses curb crawl a meaningless road pattern. In the lower picture new town Crawley's Queen's Square represents a deliberate attempt to create a genuine shopping and meeting place.

to live well out of the town. The man who has the money gets out. And with him goes his money.

18. The problem for the planner is considerable. The physical structures of the cities still exist and are very much in use as workshops and offices but most of them were constructed for operation in earlier times. Many have been imperfectly adapted to modern requirements, offices crowd into old dwelling houses, converted drawing rooms are filled with filing cabinets, stables have become garages and old cobbled streets have been given a layer of tarmac and carry endless streams of traffic which is too large and too heavy.

19. Yet even though the streets and buildings of many cities have been twisted and torn by the machinery of modern commerce, though the intimacy of their proportions has been lost under the sheer weight of numbers, many of the dimensions of the existing cities are not out of date, for there is one thing that has not changed over the centuries and that is the scale of man himself. The man of the twentieth century can walk no further or faster than the man of the fifteenth century and he uses the same size of the chair, walks up the same height of steps and sleeps in the same length of bed. Curiously these facts are often forgotten for men associate themselves physically with the machines that they have made. Buildings are designed for the machine first and the man afterwards.

20. Many architects have realized these problems and their solutions have been varied. Some have compromised by breaking up their shapes and providing within the main structures hiding places where men can escape. Others have tried to separate the buildings for men and the buildings for machines. Le Corbusier has gone a stage further and developed a mystizue which relates the proportions of architecture to the proportions of man.

21. A solution imperative. With the present speed of technical advancement and increasing world population made more complex by political unrest it has never been more imperative for man to find a solution to the problem of how he is to live with other men. In this respect the concept of the city should not be belittled. The cities of the past have been places where ideas have been shaped, men could speak and be heard, where their ideas could flow into the stream of the nation's life. No other institution devised by man has done this job so effectively. If the countryside becomes a giant inarticulate suburb in which the individual man is an insignificant dwarf then man will truly become the victim of the machines he has created and he will himself become a hollow shell.

CURRENT WORK OF DOXIADIS ASSOCIATES

HOUSE TYPES
FOR THE
KORANGI AREA

PROPOSALS ON HOUSE TYPES
FOR INCOME GROUPS A, B, C.

Prepared for the GOVERNMENT OF PAKISTAN, MINISTRY OF REHABILITATION

Planning Considerations

1. The house is the most important element of any human settlement. It is the focus of family life and satisfies the most fundamental needs of man, offering protection against the elements of nature. It further contributes to the physical, psychological and mental development of man, as an individual, as a member of a family and of a larger social unit.

2. The types of houses presented in this report are intended for families belonging to the three lower income groups (A, B and C). They have been designed on the basis of general principles dictated by natural, social, technical and economic reasons to suit the conditions prevailing in Pakistan, and especially in Korangi.

3. Social: Due consideration has been given to the requirements of social life in the Korangi area and the layout of the houses has been planned to suit the social habits of their occupants. Even the smallest and most rudimentary house-type provides two distinct areas of activity for everyday life. The front area is mainly devoted to the men and their guests, whilst the rear is devoted to the women to general family life and household activities.

4. This separation is not a rigid one and, if so desired, the house can be operated as one integrated entity.

5. Climatic: The effect of sunlight and prevailing winds determine to a certain extent the layout and the design of house. Sunlight is known to be a powerful bactericidal agent. It is, therefore, essential to design houses and the distances between them in such a way as to secure at least a reasonable minimum of daily exposure to the sun for all of them.

6. Nevertheless, in a hot country like Pakistan, the need is felt to control the penetration of direct sunlight so as to limit excessive solar heat during the hot season. Protection against undesirable solar radiation can be provided by:

   a. Basic planning and orientation.

   b. Hindering the direct penetration of the sun's rays, both to the exterior surfaces of the house and to the rooms.

7. Planting is a very effective means of protection against heat, and all house types have been provided with adequate space, both front and back, for growing screening plants. Tall plants form a natural shelter against the sun while grass reduces the reflection of solar radiation from the ground to a minimum. Small gardens also contribute to the creation of air drafts.

8. Cross ventilation is a most important factor for the creation of good living conditions. The prevailing, and also the most favorable, winds in Korangi come from the west and south west. This indicates the orientation of the swellings, since cross

ventilation is the only means to produce a cooling effect if the air within the house becomes unbearably hot, despite all protective measures against excessive solar radiation.

9. In view of the climate conditions of Korangi it was considered essential to provide every house with roofed, open-walled shelter, oriented east-west, thus open to the beneficent west breezes and creating, by its shape and position, a cooling air draft into the rest of the house.

Economic Considerations

10. Land costs: The cost of land and land development in relation to the cost of house-construction presents an important problem. General experience has proved that the higher income groups can afford to pay higher than the normal ratio of cost of land and land development. On the other hand the low income groups can hardly ever afford to pay a high cost for land and land development.

11. The size of house plots has therefore been determined principally in regard to income and to the relation which should normally exist between construction costs and the cost of the land and its development.

12. It has therefore been determined that plot dimensions should be multiples of a module of 12 feet which seems to ensure the most favorable conditions for each house without exceeding the maximum surcharge permissible for each income group.

13. Long frontages of plots are obviously undesirable and uneconomical, due to the resulting increase in the cost of community facilities (side-walks, sewerage, water supply, electricity networks, etc.).

14. On the basis of these considerations we have classified the population to be housed in the Korangi area into certain basic income groups. Each of these groups corresponds to a category of house types (symbolized by the same letter as the income bracket) and a range of plot sizes. This classification should be considered provisional as it has been based on the data made available up to now. Readjustments will have to be made in the light of further data to be provided in the future.

15. Table of incomes (in Rs)* and of corresponding house categories and plot sizes.

Income group	Monthly Income Rupees	Annual Income Rupees	House type category	Size of plot in feet
A	up to 100	up to 1200	A	24'x36' - 24'x48'
B	100 - 200	1200 - 2400	B	24'x48' - 24'x60'
C	200 - 300	2400 - 3600	C	36'x48' - 36'x60'
D	300 - 400	3600 - 4800	D	36'x60' - 36'x72'
E	400 - 600	4800 - 7200	E	36'x72' - 48'x60'
F	600 - 800	7200 - 9600	F	48'x72' - 48'x84'
G	more than 800	more than 9600	G	4500 sq.ft - 13500 sq.ft.

*1 Pakistan Rupee = $ .21

16. For the three lower income brackets, A, B and C, with which this report is concerned, the amount of money to be spent by each family on housing was assumed as equal to 2,3 annual incomes of the family.

17. The sum to be spent on land and land development was then calculated on the basis of plot sizes adopted for the houses of each income category, and at the rate of Rs 1,54 per square foot. This sum was deducted from the total amount reserved for housing, so as to leave a net amount which could be spent by families of each income group on construction cost.

18. It is obvious that this net amount to be spent by each family on house construction will vary within certain limits for each income group. This permits variations in the house type within each group.

19. Comparative table of family income and cost of house

Income Group	Annual Income	Total Amount for Housing	Plot Size	Cost of land & land develop	Net Am't for construction	House Type	Total Constr. Cost	Cost per cu.ft of built-up volume
A	up to 1200	up to 2760	24'x36'	1330	up to 1430	A01	1227	0,42
B	1200-2400	2760-5520	24'x48'	1660	1100-3860	B01	2286	0,46
						B02	1738	0,47
						B03	2552	0,45
C	2400-3600	5520-8300	36'x48'	2660	2860-5640	C01	3977	0,53
						C02	4356	0,54
						C03	4392	0,53

Architectural Considerations

20. Standardization is a necessity imposed by such factors as speed and economy which can be reached only through the application of mass production techniques necessarily based on the standardization of dimensions, design and construction.

21. Furthermore, since the conditions are exactly the same for a large number of houses the basic solutions of their design and construction cannot differ in any substantial way. It is, of course, understood that the irrational use of standardized solutions may lead to very depressing results, as has been experienced in so many cases of mass produced housing. In these cases standardization has resulted in a complete neglect of requirements set forth by special conditions pertaining to each particular group of house types and uniform communities, uniform neighbourhoods and uniform streets have been established which would be undesirable in any respect.

22. To avoid this danger, the following steps should be taken when using standard types of houses in large scale housing.

a. To provide an adequately large number of house types. This number has to increase constantly with the progresss of the program so as to make it always possible to select the type of house which will be best suited for each particular situation. The multiplication of problems resulting from the creation of many house types should be avoided by the use of certain basic elements common to all of them, so that construction may be coordinated and simplified even though the types may vary in their set up. This procedure can, of course, work only on the basis of dimensional coordination.

b. Avoidance of uniformity should be reached by varying combinations in the groupings of the houses in all the levels, from the arrangement of a small number of houses constituting the basic neighbourhood up to the layout of a vast residential community.

c. Further diversity of form may be achieved by setting aside many elements to be added by the inhabitants themselves. In this way, even houses constructed by one general building contractor will differ from each other, allowing a variety in appearance and an air of individuality. The elements to be left to the owner's initiative are colour and various light structures, as screens, canopies, fences, etc.

23. The concept of the house-type leads automatically to the need of establishing types of plots, the number of which should be limited so as to allow the possibility of using the same type of plot for several house types. The fundamental principle to be followed in creating types of plots is the acceptance of a basic module for all cases.

Among all the alternatives investigated and analysed we have chosen the module of 12 feet which allows a reasonable and desirable increase of the plot's dimensions as well as a satisfactory arrangement of the house on that plot. A minimum width of 24 feet for the plot is derived from the minimum dimensions acceptable for both the built-up area and open space of the house.

24. Regarding the optimum utilization of the amount allocated to house construction, it has been adopted as a general rule that provision of adequate living space in the house should have preference over technical refinements. The reason is that an incomplete construction can gradually be completed by the occupant himself, while basic deficiencies in the space layout can never be remedied and will always hinder living comfort.

25. Thus, in the case of house type A01, intended for the lowest income group, only those items are provided which refer to the rudimentary structure of the house as implemented in the units already built or under construction in Korangi. Further conveniences are added to the houses of category B, starting with such fundamental items as doors and windows, flooring of the shelter and parts of the garden, provision of a water tub in the kitchen and so forth, raising the standard even higher for the houses of income category C.

26. Materials: Since speed is essential for the success of the Korangi project it was considered that the adoption of current construction methods and materials for the first stages presented the only way in which a high rate of construction could be achieved from the start.

27. Nevertheless a continuous evolution and improvement of construction methods and standards should be one of the targets of the Korangi program; and improved building materials and techniques should be introduced sufficiently gradually to secure a smooth transition from the current construction methods to the most efficient and up-to-date mass production techniques.

28. One of the first steps to be made is undoubtedly to substitute hollow concrete elements for the present solid concrete ones used for wall and roof construction. This would save cement and also secure better thermal insulation.

Sanitation

29. Back lanes have been avoided because of the special problems of cleanliness and security which they raise. The elimination of back lanes has made it necessary for the sanitary group (W.C. and shower) to be located along the front fence in such a way as to allow the direct disposal of sewage, until such time as a proper sewerage system is constructed in the Korangi area. This location of utilities will then ensure the greatest possible economy in sewerage and water supply piping.

30. The arrangement of the layout allows access to the W.C. to be gained by both visitors and members of the family with the least possible inconvenience.

House Type A01

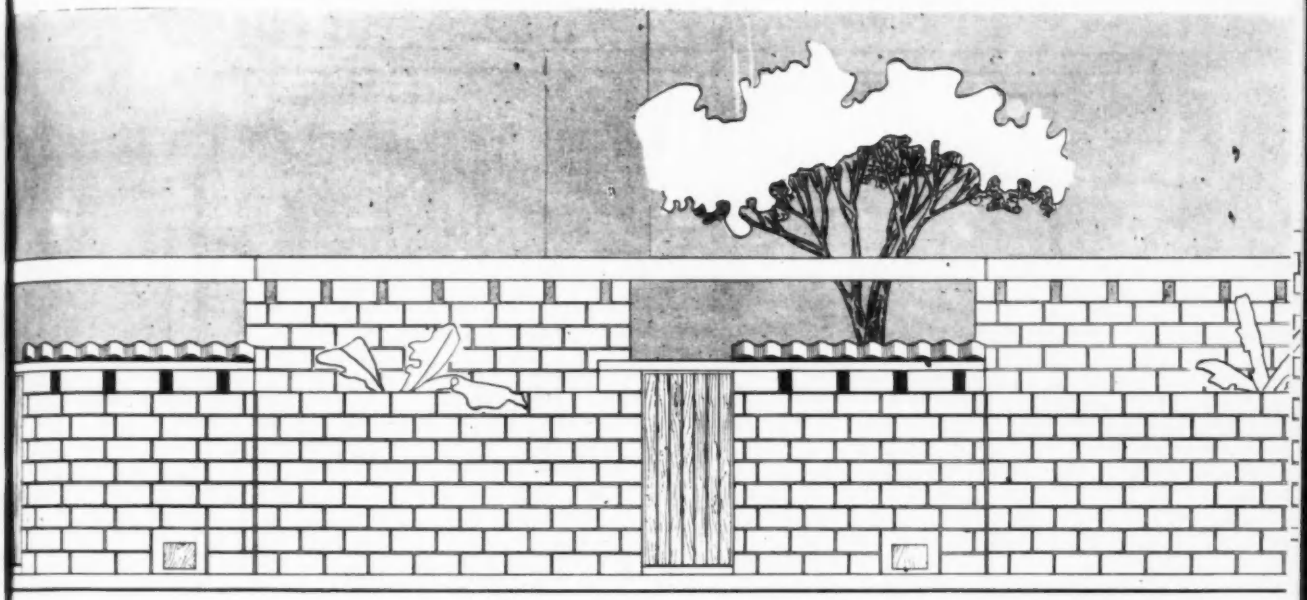
31. This layout provides a front yard for the use of visitors who thus do not interfere with family and household activities.

32. The shelter (including kitchen accommodation) is the heart of the house, easily accessible from the entrance, the room, the utilities and the back garden.

33. To allow for cross-ventilation, the room has openings on its west and east walls through which the western breeze can enter. This can be seen from the front elevation.

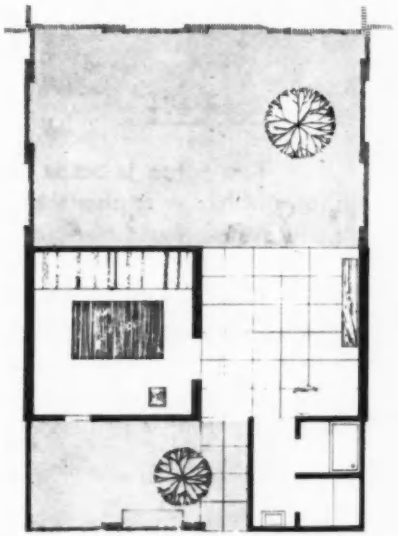
34. The occupants have the possibility to cover the front yard with straw-mats in order to protect the west wall of the room from the sun rays.

HOUSE TYPE A O1



FRONT ELEVATION

1	HOUSE TYPE A01					
2	PLOT	Area sq. ft.		Frontage ft.		Depth ft.
		864		24		36
3	BUILT-UP AREA	Total Area sq. ft.	Main Structure sq. ft.	Service sq. ft.	Shelter sq. ft.	
		361	152	65	144	
4	VOLUMES	Total Volume cu.ft.	Main Structure cu.ft.	Service cu. ft.	Shelter 50% of Actual Volume cu ft.	
		2859	1597	506	756	
5	COST	Total Rs.		Rs. per cu. ft.	Rs. per sq. ft.	
		1227.00		0.42	3.39	
6	ARCHITECTURAL PROGRAM	a	1 Room			
		b	Shelter including the Kitchen			
		c	1 W.C.			
		d	1 Shower			



PLAN

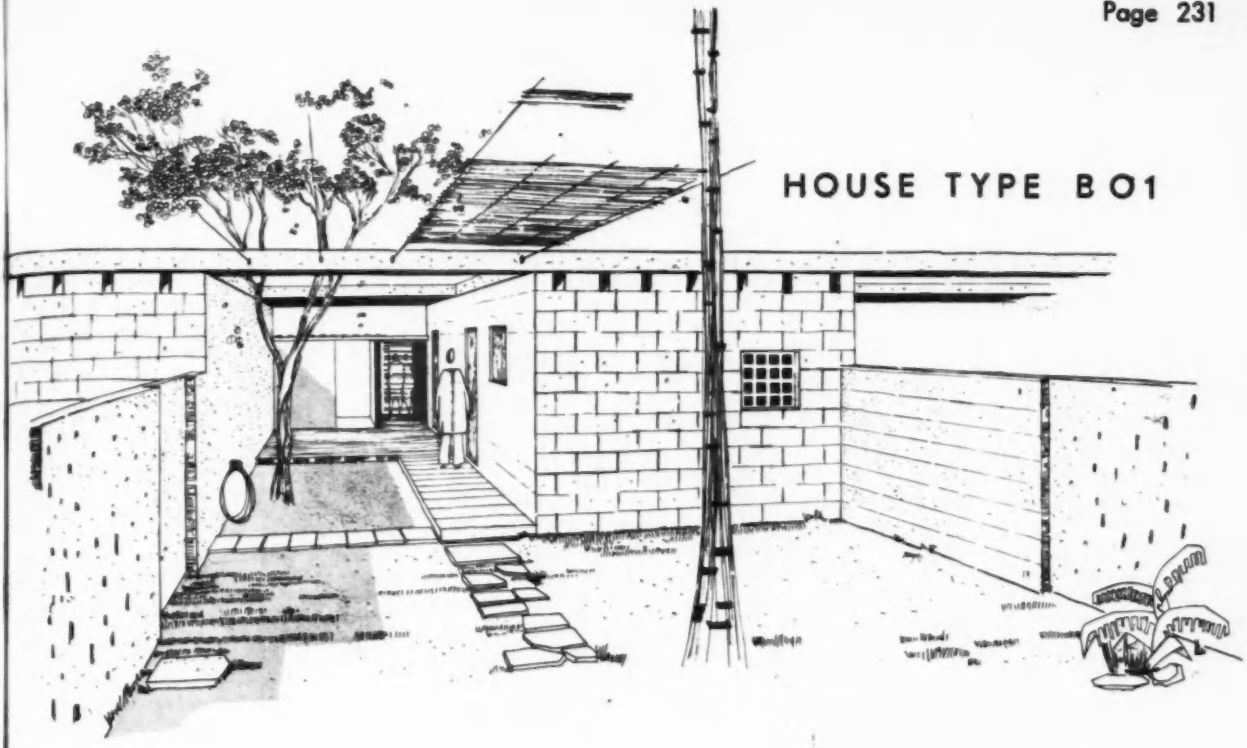
House Type B01

35. This house is based on Type A01 with the addition of one more room, larger than the first. It also includes a front yard for visitors which is isolated from the general household circulation.

36. The kitchen is again accommodated beneath a large shelter, and is easily accessible from every part of the house.

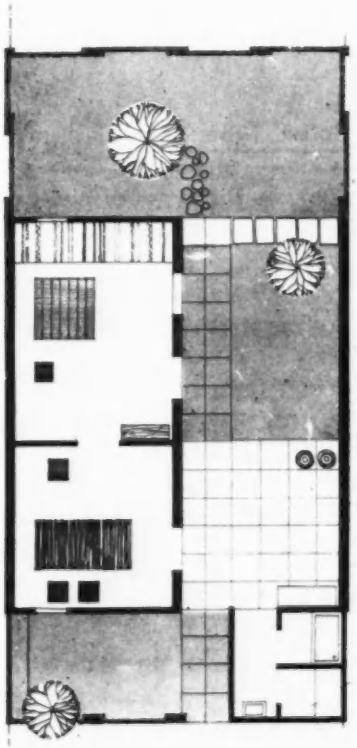
37. Openings for cross ventilation have been made on the east and west walls as the internal wall between the two rooms.

HOUSE TYPE B O1



VIEW FROM THE BACK YARD

1	HOUSE TYPE B01				
2	PLOT	Area sq. ft.	Frontage ft.	Depth ft.	
		1152	24	48	
3	BUILT-UP AREA	Total area sq. ft.	Main Structure sq.ft.	Service sq.ft.	Shelter sq. ft.
		558	349	65	144
4	VOLUMES	Total Volume cu. ft.	Main Structure cu. ft.	Service cu.ft.	Shelter 50% of Actual Volume cu. ft.
		4930	3669	506	755
5	COST	Total Rs.	Rs. per. cu.ft.	Rs. per. sq.ft.	
		2286.00	0.46	4.10	
6	ARCHITECTURAL PROGRAM	a	2 rooms		
		b	shelter including the kitchen		
		c	1 W.C		
		d	1 shower		



PLAN

House Type C01

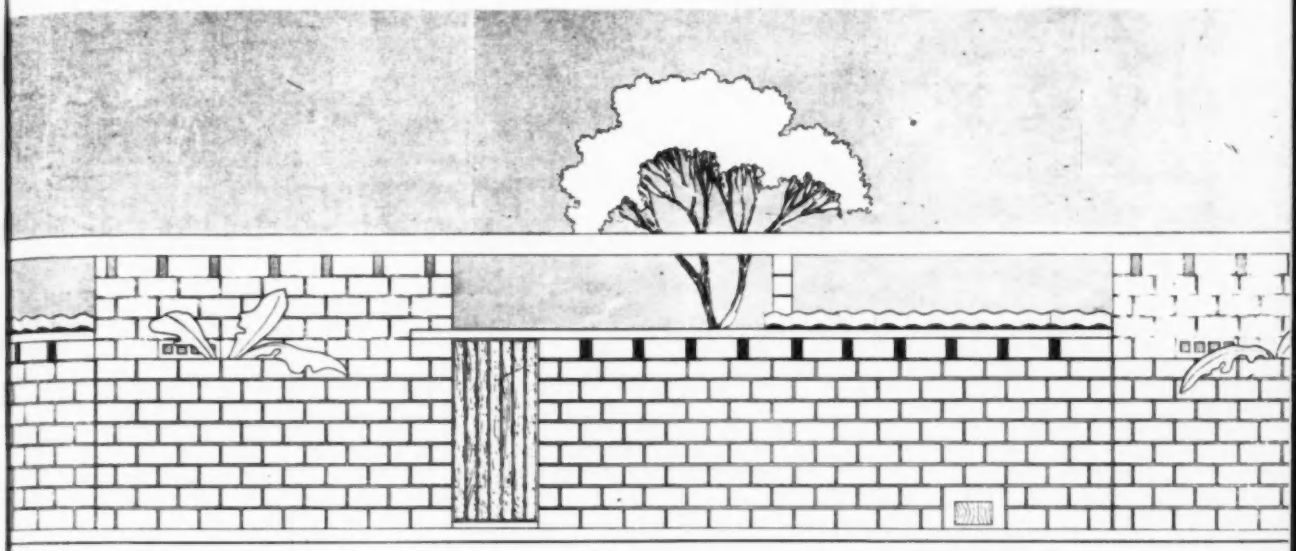
38. In the types of houses for the income group C the plot is one module (12') larger than for group B.

39. The family-room, bedroom and guest-room are grouped together leaving the shelter and the service area apart.

40. The guest-room is easily accessible from the front garden, while the family-room is the center of the house, directly connected with the other two rooms.

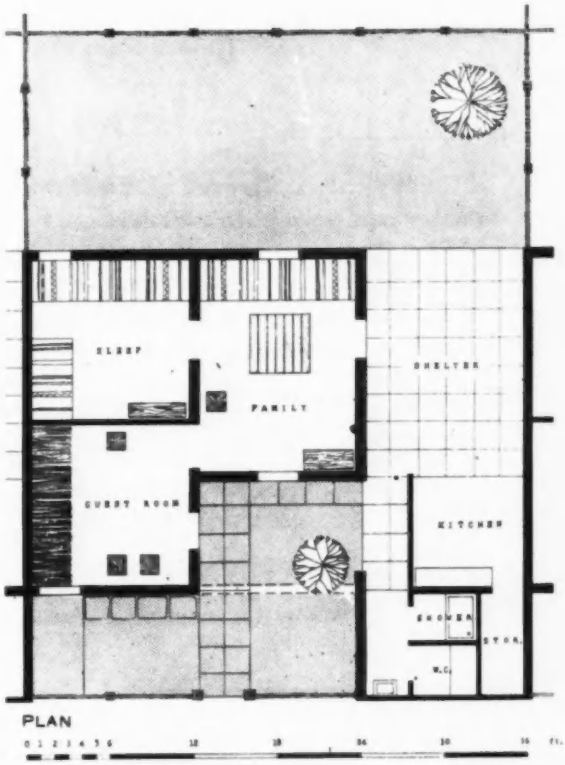
41. The kitchen opens into the shelter, which can now be considered as part of the service area. A small store-room is provided here, in addition to the main kitchen area.

HOUSE TYPE C O1



FRONT ELEVATION

1	HOUSE TYPE C01					
2	PLOT	Area sq. ft.		Frontage ft.		Depth ft.
		1728		36		48
3	BUILT-UP AREA	Total Area sq. ft.	Main Structure sq. ft.		Service sq. ft.	Shelter sq. ft.
		877	496		97	284
4	VOLUMES	Total Volume cu.ft.	Main Structure cu. ft.		Service cu. ft.	Shelter 50% of Actual Volume cu. ft.
		7458	5208		760	1490
5	COST	Total Rs.	Rs. per cu. ft.			Rs. per sq. ft.
		3977.00	0.53			4.53
6	ARCHITECTURAL PROGRAM	a	3 Rooms			
		b	Shelter Including the Kitchen			
		c	1 W. C.			
		d	1 Shower			
		e	1 Storage			



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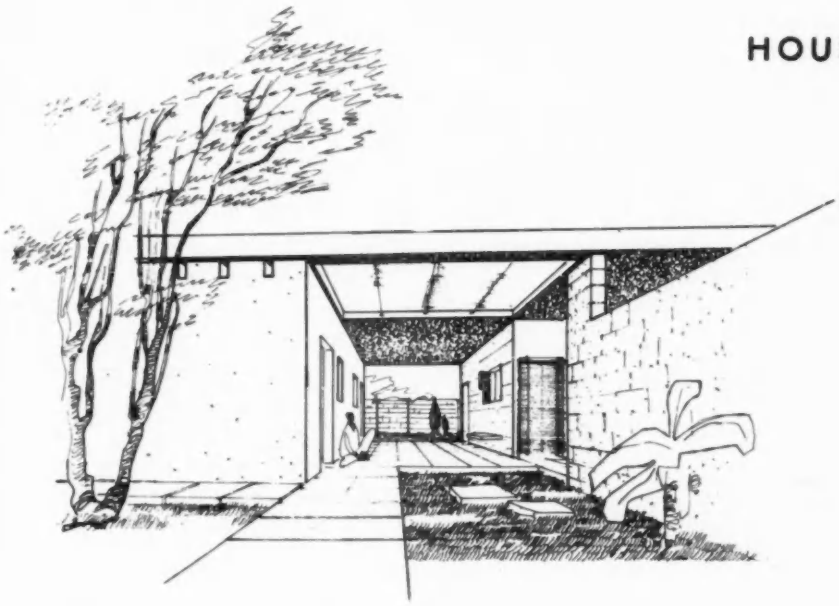
House Type C02

42. The only difference between this and type C01 is that the shelter and the family-room have been switched.

43. The shelter thus becomes the centre of the house and the main living area for the family. It is easily accessible from every point, well ventilated, and free of utilities which remain behind the fence facing onto the road.

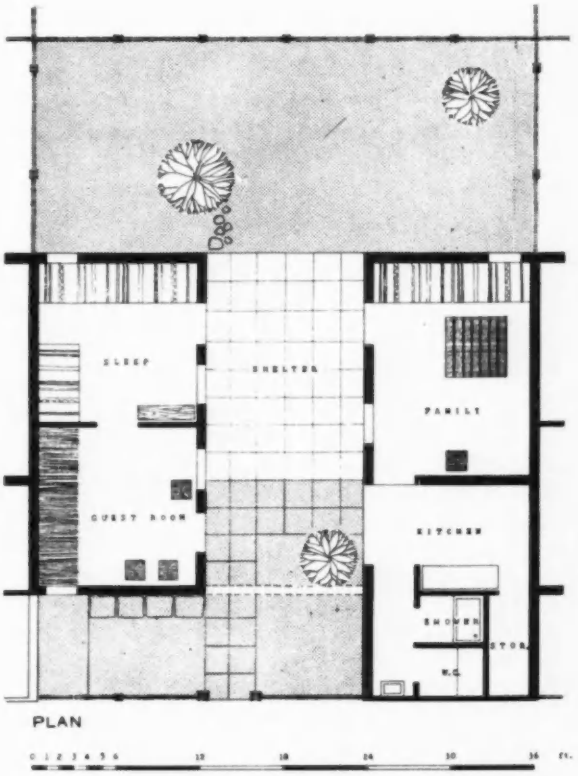
44. From the front yard visitors enter directly to the guest-room while the other rooms and the back garden are exclusively for the use of the family.

HOUSE TYPE C O2



VIEW FROM THE ENTRANCE

1	HOUSE TYPE C02					
2	PLOT	Area sq. ft		Frontage ft		Depth ft.
		1728		36		48
3	BUILT-UP AREA	Total Area sq. ft.	Main Structure sq. ft.	Service sq. ft.	Shelter sq. ft.	
		882	600	97	185	
4	VOLUMES	Total Volume cu ft.	Main Structure cu. ft.	Service cu. ft.	Shelter 50% of Actual Volume cu. ft.	
		8031	6300	760	971	
5	COST	Total Rs.		Rs. per cu ft.	Rs. per sq. ft.	
		435600		0.54	4.93	
6	ARCHITECTURAL PROGRAM	a	3 Rooms			
		b	Shelter			
		c	1 Kitchen			
		d	1 Shower			
		e	1 W C			
		f	1 Storage			



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Recent Publications

Glazer, Nathan and McEntire, Davis
Studies in Housing and Minority Groups. The University of California Press, Berkeley 4, California. ($6.00)

Grier, Eunice and George
Privately Developed Interracial Housing. The University of California Press, Berkeley 4, California. ($6.00)

Higgins, Benjamin
Economic Development; Principles, Problems and Policies. New York, W. W. Norton and Co., Inc., 1959. 803 pages. Charts, Tables. ($7.50)

Murphy, Francis C.
Regulation Flood-plain Development. University of Chicago Press, Chicago, Illinois, 1958. 206 pages. Maps, Photos, Tables. ($4.00)

Rapkin, Chester and others
The Demand for Housing in Racially Mixed Areas, The University of California Press, Berkeley 4, California. 1960. ($6.00)

Vernon, Raymond
The Changing Economic Function of the Central City. Committee for Economic Development, 711 Fifth Avenue, New York 22, New York, 1959. 92 pages. ($1.00)

Zucker, Paul
Town and Square, from the Agora to the Village Green. New York, Columbia University Press, 1959. 287 pages. Illustrations, Photos, Plans. ($15.00)

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